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THE New York Public Service Commission, Second district, in one of its recent news summaries of decisions, told about some of the freak communications which the commission receives in large numbers. One of these letters asked "from the best authority possible" the proper and authoritative date for the opening of the straw hat season. In the latest published volume of cases decided by the commission, which has just come to hand, there is reported, page 244, the case of Wheaton v. Elmira, Corning & Waverly, opinion by Commissioner Decker. The opinion takes up about six-and-a-half closely printed pages, and is rendered after a full hearing by the entire commission. It decides the question of whether or not a 10-cent fare between Holbert's Crossing, town of Chemung, and Waverly, about 3 1/7 miles, is unreasonable and unjust. At first glance, there would not seem to be a world wide difference between the spectacle of five men, receiving annual salaries of $15,000 each, devoting the time that was given to this case, and that of a man appealing to the august Public Service Commission for a ruling on the straw hat question. The generally broad, sound, common sense that the New York up-state commissioners have manifested has been commented upon in these columns. If they are called on to decide cases like the Waverly three-mile fare, it is the fault of the law creating the commission; and if they consider such cases at rather great length, it is at least a fault on the right side. It would seem, however, that there ought to be in the great state of New York some less expensive machinery for the benefit of small bodies of disgruntled or slightly oppressed people who insist on public consideration of their real or supposed wrongs. Hundreds of cases like this are constantly coming before the commission, and it must decide them; but at grotesquely disproportionate cost.

CONSISTENCY is a jewel; and railway men quite generally appreciate the fact. At least the passenger agents and the dining-car men make earnest and quite successful endeavors in that direction. Possibly it was because the passenger men with their reserves of esthetic sensibility, were not invited to join the committee of arrangements that a certain noticeable inconsistency recently happened. A special train, made up to carry a company of railway men on a two-hour excursion, was prepared in the time-honored way; the engine was the last one out of the shops, and its bright parts were brighter than the sun; the engineman and fireman had on clean overalls; the cars were clean and newly varnished, and of very late design; the trainmen were above the average in ability, and their uniforms were immaculate. Somebody had taken care that that train, exposed to a hundred competent critics, should be above criticism. But he forgot one thing: the whistle. It was out of adjustment, one or two octaves too high in tone, and every screech sounded like the appeal of a fiend to draw the passengers' attention away from their pleasant surroundings—and the screeches were very frequent. A deaf person would have enjoyed that trip greatly. The ordinary passenger could enjoy it only by forcibly deadening his auditory nerves—which is not always easy. As the passengers were all deadheads we shall hardly be warranted in addressing our homily directly to the business instinct, for probably no money has been or will be lost; but it seems worth while to consider the feelings of passengers—even deadheads—and indeed of trainmen and the dwellers on the farms along the road, from the purely academic or scientific standpoint. The ideal passenger train should be pleasing to the eye, the ear and the nostrils. Another thing was forgotten, not only the whistle, but the man who blew it. He had never been trained in sane whistling. There was a crossing about every mile, and at each one of them he sounded the whistle two to four or more times as long as was necessary. We do not charge this offense against the officer who planned this train, for this unnecessary disturbance of the atmosphere is very common. It prevails on the best roads and on some of the best trains. The desirability and the feasibility of sounding the crossing signal in two seconds has been set forth in these columns repeatedly, and we are not, perhaps warranted in repeating the lecture at this time; but it will be agreed that every passenger engineman ought to be a good workman—one who knows how to perform his duties in the best manner—and it is obvious that one who cares nothing about time (as defined by the musician) or noise, or the accuracy with which he obeys a rule, and who takes no thought of the feelings of sick persons, or the example of enginemen who sound the whistle correctly, is not such a workman. One of the most

effective ways to promote the efficiency of enginemen in important matters is to compel them to perfect themselves in the small and seemingly unimportant things. "Trifles make perfection."

THE Massachusetts senate has asked the state railway commission for an opinion as to whether the extension of the Grand Trunk (under the charter of the Southern New England) through New Hampshire to Boston would be in the public interest. President Mellen, of the New Haven, was quoted some time ago as saying to the New York Public Service Commission that the entrance of the Grand Trunk into New England was inevitable, and when one contemplates the "hinterland" out of which this project springs one must perforce agree with Mr. Mellen's conclusion. To be sure, this is not the first invasion of New England by the Grand Trunk. The control by this system of the Central Vermont through ownership of a majority of its stock has given it a line through Vermont to White River Junction, and down the Connecticut river to Windsor. From there to Brattleboro it has trackage rights only, but from Brattleboro to New London, Conn., it has a through line as a result of the lease of the New London Northern to the Central Vermont. The successful struggle of the Grand Trunk interests for an entrance to Providence is so recent as to be still remembered. Under the charter of the Southern New England, the Grand Trunk is building from Palmer, Mass., at a junction with the New London Northern, to Providence, where an extensive dock system is to be established. Finally, as lessee of the Atlantic & St. Lawrence, the Grand Trunk runs south through the state of Maine to Portland. But New London and Providence are as yet of little importance, except for coastwise traffic, and there is no immediate prospect of their developing into important terminals for ocean commerce; Portland is of little or no use in the winter. At Boston the desired ocean facilities the year round are available, and the present enthusiastic attitude of the Boston people toward the entrance of the Grand Trunk seems to insure the facilities needed for adequate terminal development. Whether or not the enthusiasm of the Boston business interests is justified, in other words, whether or not the building of the road is defensible from the economic standpoint, depends altogether upon whether the road can create its own traffic. It is practically to parallel the New Hampshire lines of the Boston & Maine. It is obvious that if the new road is merely to divide existing traffic with the old it will impose on the public the added burden of maintaining an unnecessary investment. If, however, it can create its own traffic, its entrance ought not to be stayed, for it will be of tremendous advantage to Boston in increasing its importance as an ocean port, and it will vitalize the entire railway service throughout northern New England. As to the first point, with the rapid development of the Canadian Northwest, and the grip that the Grand Trunk is securing in the territory as it is settled up, there ought to be no question of the wealth of traffic that will pour through the Boston gateway. The new line ought certainly to support its own investment. As to the second point, we have doubtless passed beyond the period of reckless railway competition, and it is fortunate for the public that this is so. But there is still opportunity for a healthy competition in service between railway systems, that will accrue to the advantage of the traveling and shipping public. The Boston & Maine, burdened by a multitude of unproductive leases and with a management not highly progressive, has for many years come short of furnishing a service satisfactory to its patrons. The purchase or control of the road by the New Haven may mean improvement, but the process is slow in face of the financial difficulties, and the improvement since the entrance of the New Haven into possession is not very evident. It is not then surprising that the people of northern New England are watching with great interest the progress of the Grand Trunk in its negotiations.

PREPARED FUEL AND LARGE GRATES.

IN his paper before the International Railway Fuel Association on Fuel as a Factor in Locomotive Capacity, which is published in this issue, Dr. Goss suggests two methods of increasing locomotive capacity: one by better adapting the fuel to the requirements of the service, the other by designing the boiler, especially the firebox and grate to better suit the fuel requirements.

The first method would improve the quality of the coal by screening to exclude the fine coal and slack, by sizing to obtain a fuel of uniform size, and by washing, thereby rejecting much of the slate, bone and other material which produces clinker and ash. The second method deals principally with increased grate area, and suggests the possibility of using an area of 150 sq. ft., having a length of 20 to 25 ft. While there are good theoretical reasons for each of these suggestions, the latter especially involves such radical changes in present practice that it does not seem likely to receive practical application to any extent.

The full realization of the first proposition would be the use of briquettes, and that may become the practice for passenger service in this country, as it now is on European railways. For freight service the tendency is rather in the opposite direction, and run-of-mine coal, which has all the faults which the author regards as undesirable in locomotive fuel, is coming more and more into general use. This is the extreme condition, and the cheapest form in which coal is delivered to railways. There are some grades of coal which require screening, and others where washing would prove economical, but the special preparation of any good coal by screening and washing, for the purpose of obtaining additional capacity in the locomotive, will add to the cost of fuel to such an extent that most railways will continue to use raw coal on account of its low cost. The successful development of the mechanical stoker is also calculated to encourage the use of low grade fuel, for there is no objection to the larger amount to be handled, and it is possible to use larger proportions of fine coal in this way.

The use of a very large grate area with a firebox as long as 20 to 25 ft. is an interesting proposition, but the modification in the design of the locomotive necessary to secure such an arrangement would doubtless be attended with such disadvantages in the operation of both boiler and engine that they would more than offset any gain due to a better boiler performance.

Such a design would be better suited to a power plant or to marine service where the operation at normal capacity is continuous for a week or more at a time. The large amount of coal required to prepare the fire, and that lost when the fire is dumped, would make it a very wasteful operation if repeated every day, as in present locomotive practice. The repairs to stokers and to the grates would increase in proportion to the increase in area, and the time required for such repairs would occasionally keep the engines out of service and the useful mileage per month would be reduced.

The large grates now used in Mallet, Mikado and Mountain type locomotives, though only half as large as those proposed, have several of these disadvantages. When the fire is new it requires skillful firing to keep the grates covered uniformly, and if there are thin places where an excess of air is drawn through by the heavy blast of the exhaust, the furnace is cooled and the gases escape under conditions of incomplete combustion. These objections also increase with the large addition to the grate area, and are liable to neutralize the advantages due to increased capacity and reduced spark loss.

Before such a radical change is made in locomotive design, other methods of supplying heat for increased capacity are likely to be adopted. The application of the Diesel engine to the locomotive, though now in its experimental stage only, may become an accomplished fact, and the large saving in fuel thus made possible will extend the zone in which oil fuel is economical for locomotive use. The saving in weight, due to the removal of the steam boiler, would permit of a large installation for a gas producer in connection with gas engines for locomotive use.

Such a combination might be preferable to the cumbersome grates and stokers which are contemplated in the method which Dr. Goss proposes for obtaining large capacity in locomotives.

THE PANAMA TOLL QUESTION.

THE house committee on interstate and foreign commerce, after investigation, reported in favor of legislation imposing tolls on American vessels using the Panama canal. The house last Thursday rejected the report and passed a bill making the use of the canal free to American vessels. The house bill would also exclude from the canal ships owned or controlled by railways.

The whole people of the United States are paying in taxes for the construction of the canal. It should, therefore, be operated for the benefit of the whole people. If ships using it cannot make rates that will take business from the competing railways, and be even lower than those now made by steamship lines, and at the same time pay tolls that will cover the expenses of maintaining the canal and the interest on the investment in it, the canal, from a transportation standpoint, will be a failure. There is, however, no evidence that vessels using it will not be able both to pay reasonable tolls and make rates between the Pacific and Atlantic coasts lower than any now charged. This being the case, there is no good reason why they should not be required to pay tolls; and there are several good reasons why they should be. American vessels already are given by the navigation laws a monopoly of the coastwise trade of the United States. This is one form of subsidy. If the expenses of maintaining and operating the canal and of paying interest on the large investment in it are not met from receipts from tolls, they will have to be met from taxes levied on the entire people of the United States; and every dollar from the public treasury applied to this purpose will be an additional subsidy to the steamship lines. No wonder, then, that after the passage of the house bill there was rejoicing in the camp of the ship subsidy beggars who have been importunately, but unsuccessfully, besieging Congress at every session for years.

Not only would the passage of a no-toll law involve additional susidizing of the steamship lines, but, while the taxes to pay the subsidy would be collected from all of the people of the country, the effect of its payment would be to benefit some sections at the expense of others. This was recognized in Congress, and the vote on the canal bill was largely on sectional lines. The communities on and near the Pacific and Atlantic coasts already, because of their proximity to water transportation, have an advantage in freight rates over inland communities. The opening of the canal, even if reasonable tolls were levied, would doubtless increase the advantage of the seaboard communities, and the disadvantage of the inland communities; and to make it toll-free is to further increase their relative advantages and disadvantages. Congress passes legislation to prohibit discrimination by railways between sections—and then takes the money of the public and lays it out in ship subsidies to create precisely the same kind of discriminations between exactly the same sections.

The statesmen who voted for the no-toll provision evidently may be roughly divided into four classes. First, there were those who for years have been valiantly representing the ship subsidy beggars, and who saw in this legislation a means of granting the subsidies without seeming to do so. Second, there were those representing districts on and near the Atlantic and Pacific seaboards, who were influenced by considerations of sectional advantage. Third, there was a large class who knew nothing about the merits of the question, and who voted on the theory that a no-toll policy would hurt the railways and that, therefore, it must be a good thing. Fourth, there was a large class who have heard that cheap water transportation is a good thing, and who think that, therefore, water transportation should be made as cheap as possible *for the shipper,* even if the *public* has to pay for it.

The provision prohibiting the use of the canal by boats controlled by railway companies is dictated by the same grade of political and economic intelligence that drafted and voted for the no-toll policy. The National Waterways Commission was created by Congress, and is composed of seven senators and five members of the house. Its final report—made after an investigation covering three years—has just been published. The commission discussed the growth of railway control of boat lines and the refusal of the railways in many cases to make through rates and traffic arrangements in connection with independent lines, and then (on page 20) said:

"This situation calls for additional legislation not only to prevent the elimination of water competition by this means, but also to protect the public against the raising of water rates which railway control over boat lines makes possible. Legislation to this end is as necessary for the preservation of water transportation as is the prohibition of rate cutting and other discriminatory practices, *but it should not be of a character to discourage legitimate investment in the business of water transportation, even by railway companies. If the activities of boat lines are properly regulated in the interest of the public, the question of ownership or control will become of minor importance.*"

The italicized statements show the attitude of the commission toward proposals to prohibit the control of boat lines by railways. It doubtless recognizes the fact that legislation prohibiting railways from acquiring and operating boat lines will not accomplish the desired object. That object is to maintain competition, and it will not be attained by the proposed means, simply because, regardless of the proposed legislation, the same interests that control the railways would get control of steamship lines, even though the railways themselves did not do so, and the results would be very much the same as those of railway control. As the National Waterway Commission indicates, the just and effective way to deal with the situation would be, not to try to control the ownership of the steamship lines, but to give the Interstate Commerce Commission authority, regardless of their ownership, to control their acts. However, inasmuch as Congress habitually ignores alike the lessons of experience and the recommendations of all persons or bodies having even a semblance of expert knowledge, it can hardly be expected that it will pay any more attention to the views of the National Waterways Commission than the house has to the views of its own committee on interstate and foreign commerce.

The whole Panama canal problem is being handled in a spirit of sectionalism, prejudice and political opportunism—in the same spirit which has dictated the handling of river and harbor bills and appropriations for public buildings. The only interest that ought to be considered is that of the nation as a whole; and it is being sacrificed to the interests of particular sections, of ship subsidy grafters and of political aspirants. Imagine what the results to the country would be if government ownership of railways were adopted and Congress were given an opportunity to deal with the operation and development of our 240,000 miles of railway in the same way!

NEW BOOKS.

Laboratory Manual for Testing Materials of Construction. By L. A. Waterbury. 5 in. x 8 in. 270 pages. 68 illustrations. Cloth binding. John Wiley & Sons, New York. Price, $1.50.

It is common for each instructor of courses in materials testing in technical schools to outline the courses for his own classes, and the author of this book has drawn largely on his experience in teaching such courses for the experiments which are included in the book. It has been the intention to cover the subjects fully, and for schools requiring all testing work to be done in a one year course many of the experiments would have to be eliminated. In addition to the tests of cement, which are the same as those published by the same author in a previous book, tests of concrete, stone, asphalt, sand and gravel, wood, iron and steel are included. In addition to these outlines of experiments there are chapters on testing apparatus and a number of appendices covering standard tests and specifications for various materials of construction.

Letters to the Editor.

POOLING OF EQUIPMENT.

New York, April 23, 1912.

To the Editor of the Railway Age Gazette:

The writer of the article on "Pooling of Equipment" in your issue of April 12, 1912, from Houston, Tex., signed "Transportation," evidently believes that the pooling of equipment will be a panacea for all the ills of car distribution; but, given the same conditions that exist today, I cannot see where the pool would be any help.

As a general proposition, when business is good and cars are in demand, this condition does not apply to one road, but to all. Taking his own example, for instance, of a road holding empty cars belonging to its neighbors and the shipper with the full warehouse demanding and pleading for equipment, it must be remembered that on the neighbor's road there is another shipper demanding and pleading for equipment. Now, who is entitled to the cars, the owner or the borrower? What shipper is entitled to the cars, the shipper on the owner's road or the shipper on the borrowing road? If, under pool regulations, the shipper on the borrowing road gets the cars, who is going to take care of the shipper on the car owner's line?

I believe the first principle of a car pool is to apply the nearest car to the nearest load. I can conceive an ideal car pool where every road in the pool will own enough cars to take care of its maximum business, where every road has equally good power to haul the equipment, where every road has equal facilities for repairing cars, where every car is built of the same materials and is of the same capacity and value, where allowances are made for supplying the little roads owning no equipment, where every road has a good car distributor who can keep the balance even between himself and his competitors, where no car congestions and embargoes arise to disturb the balance of equipment so that each road can get its share of the cars without delay, where consignees are all prompt in unloading, where steamships are right on the job when cars arrive at terminals; in fact, where cars can be moved around like checkers on a checker board. But it all seems Utopian to me under the present conditions, and, after all is said, the fact still remains that the owner has the prior right to the use of his cars.

While laying stress on the fact that the Interstate Commerce Commission has demanded that where through routes have been established, the owner must permit his cars to be used, "Transportation" does not emphasize very strongly the statement of the I. C. C., that "The temporary confiscation by carriers of the cars of other railways is alike unlawful," and that "Carriers are required to make reasonable rules and regulations with respect to the exchange, interchange and *return* of cars."

I notice that the writer makes mention of a large system holding its cars at one or the other end of its road for prospective business, while at the same time it is hauling its neighbors' cars empty east and west for delivery to the home roads. Well, what is wrong with that? Are we not required by the commission to recognize the rights of the car owner? Is it not practically hauling cars to a point whence business emanates? If loading in that direction is available, the cars are loaded; but if no loading is available, would it not be necessary to protect the owners even under a pooling system, if not with their own empty cars, then the empty cars of some other road?

Statistics show that approximately 70 per cent. of the car movement is loaded and 30 per cent. is empty. When you take into consideration the large percentage of coal cars which of necessity must run 50 per cent. loaded and 50 per cent. empty, this showing of 70 per cent. loaded is a remarkable performance, indicating as it does that 20 per cent. of the return movement is utilized for loading. And while, theoretically, a pool contemplates the elimination of the remaining 30 per cent. empty, in actual practice I am well satisfied that it would not be able to eliminate 10 per cent. empty, let alone 30 per cent.

Let our friend "Transportation" then get aboard the good ship "Car Service Rules" made mandatory; he will find many of his friends aboard who think they will accomplish the purpose of the Interstate Commerce Commission. And let us all make an effort to stick to these "Golden Rules," even if we have to buy more cars so that we will not have to prey on our neighbors for cars when business is good.

FAIR PLAY.

EMPLOYEES AS STOCKHOLDERS.

New Orleans, La., May 18, 1912.

To the Editor of the Railway Age Gazette:

The editorial on the Railway Labor Situation appearing in your issue of May 10 contains the interesting suggestion that there is no reason why a railway cannot do what some large industrial concerns have done towards creating stockholders among their employees. The organization of the United States Steel Corporation and the reorganization of the Baldwin Locomotive Works afforded better opportunities for the inauguration of a plan enabling its employees to become stockholders on a small scale than have been available to the railways. If the latter could offer their employees inducements comparable to those made by these industrial companies, it is likely that they would be nearly as well received by a large number of employees whose excellent wages and moderate scale of living have placed them in a class of investors whose capacity to absorb high class securities would be by no means small.

Many railway men put their money in investments of doubtful security and are distrustful of any railway or industrial stock that comes from Wall street. It is probable that railway employees will never regard with as much confidence investments in the company that employs them as do the industrial workers, whose relations with their employers have a more personal character. The absence of this personal relationship on the railways makes participation in stock ownership by employees all the more valuable as tending toward bringing about that community of interest that should exist between employer and employees. Judicious investment in securities that are now on the market should accomplish something towards effecting the desired co-operation, and I am inclined to think that the railways would not find it difficult to interest many of their employees in the purchase of such stock. They could safely assist any employee of good standing to purchase on partial payments a single bond or a few shares of stock, although any tendency towards speculation would have to be guarded against. A proposal to encourage in a practical way investments of this class should be laid before employees with great frankness, and the purchase of safe securities, personally solicited through a special representative of the company. By so doing the railways can in a measure supplant the promoter of unreliable investments who now haunts every division terminal and general office in the wake of pay-day.

L. G. PLANT.

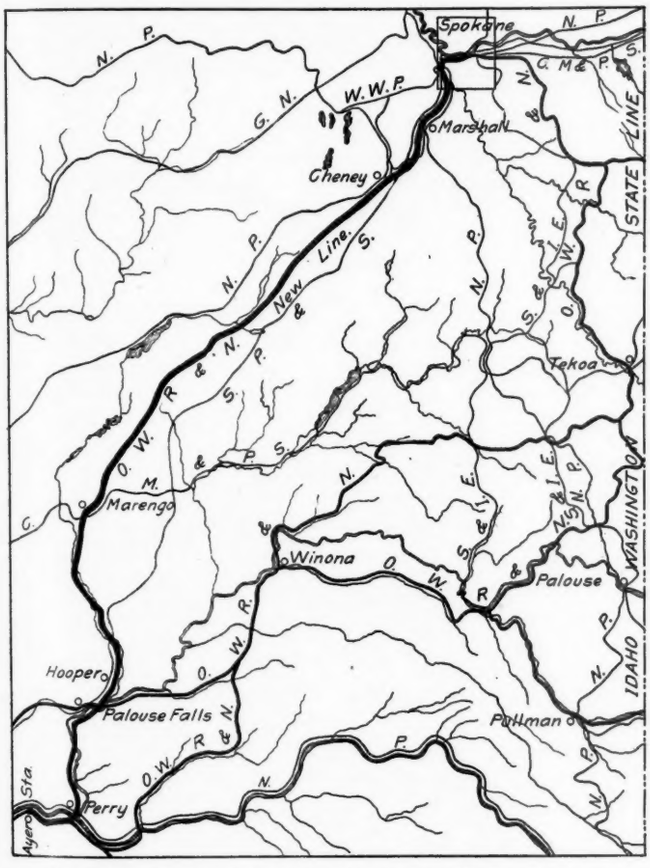
The introduction of electricity on the main lines of Scandinavia is a matter that has long been under consideration, and at present competent officials are working out its practicability. There is not very heavy traffic, and only limited sections are double tracked. The absence of coal in these regions is the cause, of course, of the rapid development of electric power, and has caused its adoption on the railways. Hitherto it has been found by comparative tests that electricity, at all events in these regions, is cheaper as a driving power on the railways than steam.

HARRIMAN LINES SPOKANE-AYER CUT-OFF.

Heavy Work Begun by the North Coast and Continued by the Oregon-Washington Railroad & Navigation Company.

Some of the heaviest construction work now under way in this country is on the new line of the Oregon-Washington Railroad & Navigation Company from Spokane, Wash., to Ayer on the south bank of the Snake river, the grading on which is now largely completed. This line was located and early construction work started under the name of the North Coast railway, whose identity and backing were a question of so much conjecture a few years ago. A description of the successful way in which its identity was kept secret until public announcement was made of the affiliation of the North Coast line with the Harriman interests last spring, with an outline of the work planned in the state of Washington, was given in the *Railway Age Gazette* of August 11, 1911.

The construction of this line indicates the intention of the



Location of New Line from Spokane, Wash., to Ayer.

Harriman interests to compete more strongly for the Spokane-Portland business with the Hill lines, which control the Spokane, Portland & Seattle Railway. The O.-W. R. R. & N. Company has a line from Spokane to Portland, but it is very indirect and is expensive to operate because of its heavy curvature and grades. Starting from Spokane this line goes almost directly east for several miles to Yardley on the Northern Pacific, then turns southeast, passing through Tekoa, near the Idaho line. From this point it swings southwest and crosses the Snake river at Riparia, where it connects with the Portland-Lewiston line of the O.-W. R. R. & N.

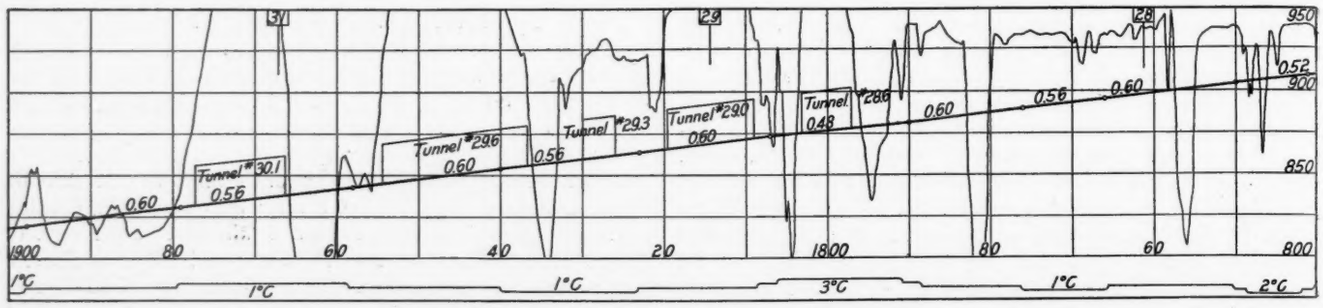
The new line starts from new terminals in the center of Spokane and extends almost directly southwesterly to Ayer, where it connects with this same Portland-Lewiston line of the O.-W. R. R. & N. It closely parallels the Spokane, Portland & Seattle from Spokane to Hooper, about 81 miles, near which point it crosses the North Bank line and runs down the canyon of the Palouse river to the Snake river. After crossing the Snake river and the O.-W. R. R. & N. track on a high bridge, it parallels the old line until it descends to the level of this line and connects with it at Ayer. The distance from Spokane to Ayer on the new line is 102 miles, or 54 miles shorter than by the present line, and 9.5 miles shorter than any other existing line. The grade is reduced from a maximum of 3 per cent. to 0.6 per cent., and a large amount of rise and fall is eliminated. The curvature is also reduced from a maximum of 10 deg. to 3 deg. on the new line. To secure this low grade line required very heavy work, especially near the south end through the Palouse canyon. Starting from Ayer there is an almost continuous 0.6 per cent. grade for 48 miles with but three short sections of level grade included to reach the level of the first bench. The grade is then slightly undulating, but gradually rising for 20 miles, after which there are 13 miles of maximum grade to reach the summit. At Cheney, which is the highest point between Portland and Spokane, the grade is light for about six miles, and then there is an almost continuous descending 0.6 per cent. grade into Spokane. There is no adverse grade against westbound traffic from Cheney to Portland. This compares very favorably with the low grade S. P. & S. line built several years ago, in which the maximum grade from the Snake river to Cheney was established at 0.4 per cent., with a 1 per cent. maximum grade for some six miles entering the city of Spokane.

Sites have been secured for new passenger and freight terminals in the heart of Spokane separate from the existing terminals of the Harriman Lines at that point. Several blocks of property have been bought on the north side of Front avenue, between Monroe and Center streets, for an extensive passenger terminal to be used jointly with the Chicago, Milwaukee & Puget Sound, the Idaho & Washington Northern and the Spokane International. To provide room for this terminal it was necessary to buy the site of the present city hall, as well as several other large business blocks. The station building will face on Front avenue, directly opposite Stevens street. This location puts the new station within two blocks of the center of the business district and closer down town than any of the other stations. The Chicago, Milwaukee & Puget Sound will enter the station from the east, while the Oregon-Washington Railway & Navigation line will come in from the west. The tracks of both roads will be elevated through the city, and all streets will be carried under the tracks. All grade crossings in the residence districts along the new line are also eliminated by the construction of a number of reinforced concrete subways. The work on the Chicago, Milwaukee & Puget Sound entrance into the city is now well under way, while the site is being rapidly cleared for the new station.

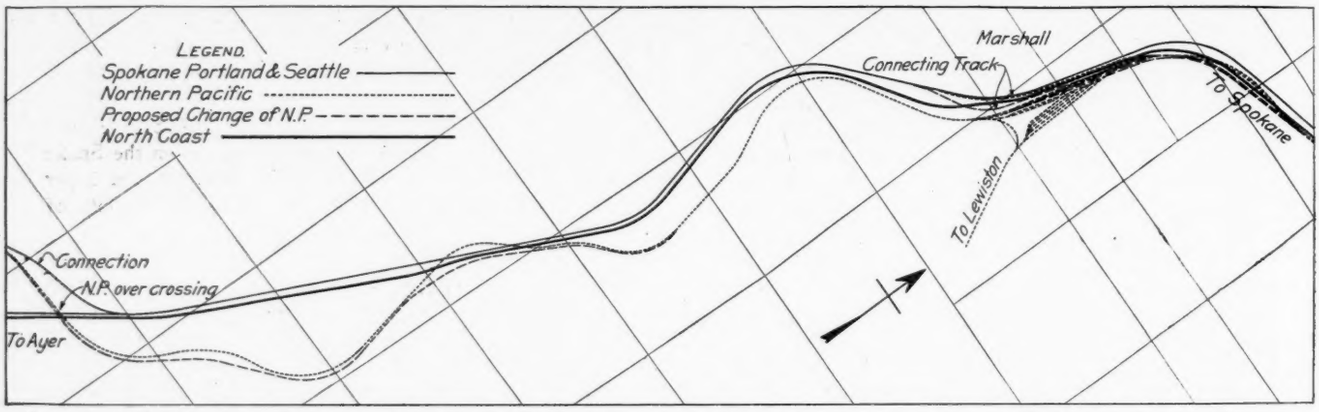
Extending westerly from the new station, the O.-W. R. R. & N. line crosses above the north end of the new Monroe street concrete arch bridge and over the Spokane river on a large steel structure. Just west of this bridge a 700,000-yd. fill will be made, the material for which it will be necessary to haul seven or eight miles. A new freight station will be located on Monroe street, while a new freight yard will be located along the river, about half a mile west of the Monroe street crossing.

A short distance west of this yard the line turns south and crosses the Spokane river and Hangman creek on a steel viaduct 3,400 ft. long and 185 ft. in maximum height. The line follows Hangman creek and Lake creek, about nine miles to

Marshall, between the lines of the Spokane, Portland & Seattle and the Northern Pacific. At Marshall, and also at another point two and one-half miles south, it was necessary to move the Northern Pacific tracks east far enough to enable the new line to be constructed between these tracks and those of the Spokane, Portland & Seattle. At Marshall it was also necessary to move the Northern Pacific station, and to rebuild a connecting track between the two lines. This connecting track is maintained for the use of Northern Pacific trains, a portion of which use the Spokane, Portland & Seattle line from Pasco to Marshall because of the lighter grades, and cross over to their own tracks at Marshall. At a point about two miles south of Marshall the Northern Pacific made a detour around a high rock point. The grade line of the Spokane, Portland & Seattle is about 20 ft. above that of the Northern Pacific at this place. This line cuts through the end of this point, crossing over the Northern Pacific tracks twice on timber bridges. The North Coast line cuts still further into the hill, and to avoid two crossings with the Northern Pacific arrangements were made to move their tracks east of the North Coast line. This required some very heavy rock work, and also made necessary the reconstruction of about five miles of the Northern Pacific. This change of line incidentally reduced the Northern Pacific grade at this point from 1.25 per cent. to 1 per cent., and also improved the alinement. The accompanying photograph shows the character of the work at this point, the trestle in the left-hand corner being that of the Spokane, Portland & Seattle crossing the Northern Pacific line, while the temporary trestle in the foreground is a construction trestle for the North Coast line.

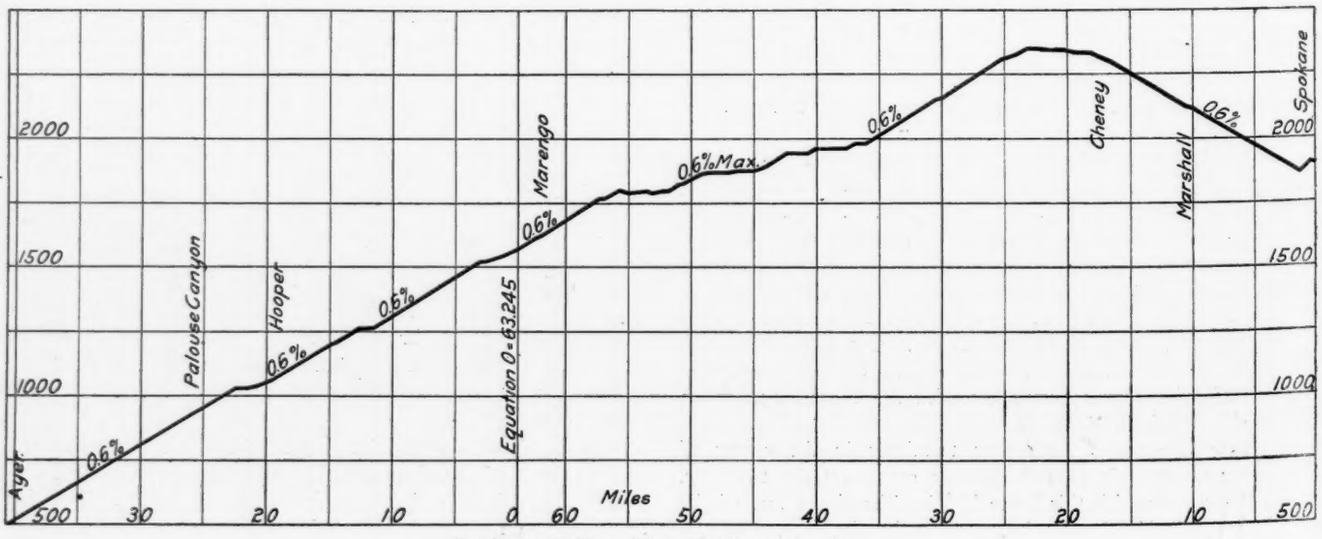


Profile Showing Heavy Work Through Palouse Canyon.



Change of Northern Pacific Alinement Through Marshall Canyon, Showing Location of the North Coast and the Spokane, Portland & Seattle.

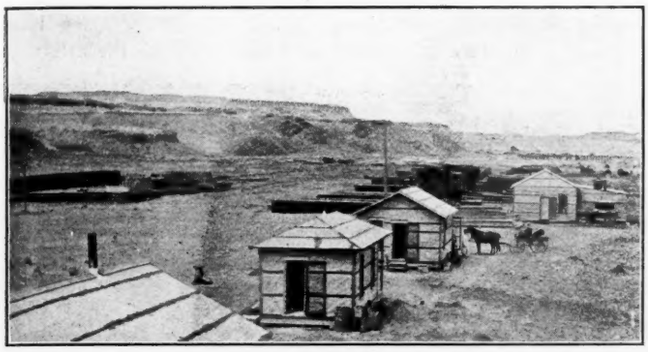
The excavation at the Northern Pacific crossing and at the point two miles south was from 30 to 60 ft. deep through rock, and immediately adjacent to the Spokane, Portland & Seattle



Profile of New Line Spokane to Ayer.

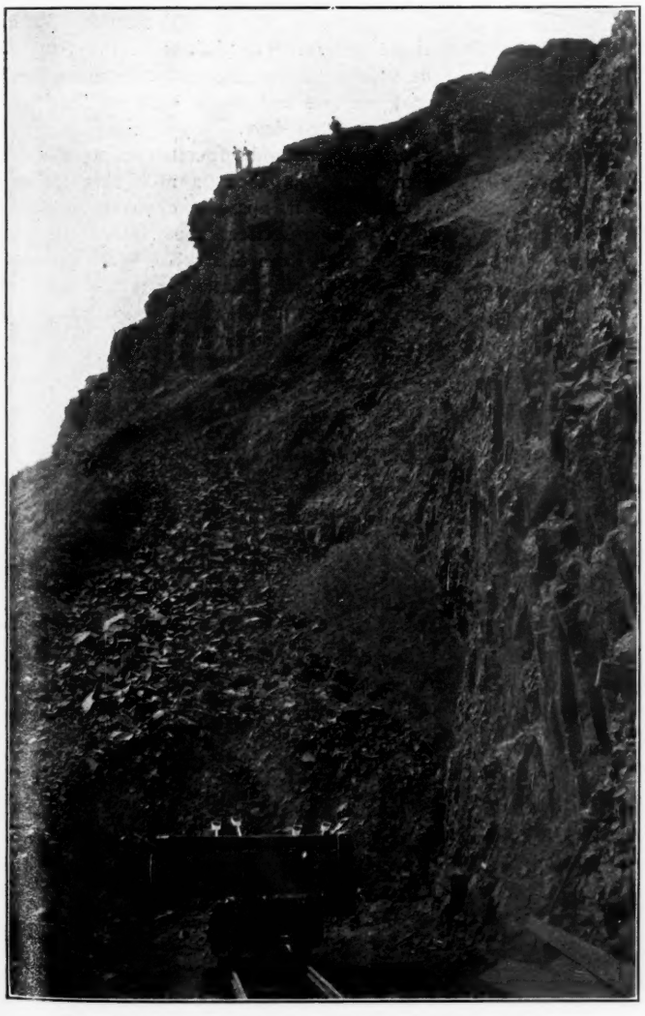
line. It was necessary to excavate this material without running any danger of blocking the Spokane, Portland & Seattle line in any way. For this reason the contractor was required to do light blasting and the rock was taken off in successive layers. This caused additional work on the part of the contractor in the construction of switchbacks to get the material down from the higher levels into the fills, but it was necessary, owing to the close proximity of the main line.

Two miles south of this cut at Cheney the North Coast crosses



Material Yard at Hooper, Wash.

over the Spokane, Portland & Seattle and continues southwest generally parallel to this line to a point near Hooper, where it crosses under the Spokane, Portland & Seattle through a 600-ft. tunnel and turns into the canyon of the Palouse river. From Cheney to Marengo the grading, which is all completed, was not



Typical Rock Work in Palouse Canyon Section.

heavy, and there was but one waterway requiring an opening larger than a pipe. At Marengo, the main line of the Chicago, Milwaukee & Puget Sound is crossed. This line from Marengo north to Spospokane will be used by the Chicago, Milwaukee & Puget Sound as its western entrance into Spokane.

Northern Pacific Change in Marshall Canyon.

South of Marengo the grading to Ayer is divided into four contracts, the limits of which are defined by the first and second crossings of the Palouse and the crossing of the Snake river. From Marengo to Hooper the work is fairly heavy and is now practically completed. South of Hooper the grading is very heavy for the entire distance to Ayer. As this section of the line was built on a supported maximum grade, it was not possible to locate in the bottom of the canyon to secure the easiest work. For a large part of the distance the line is supported near the top and at the second crossing of the river the bridge site is located on the high points shown in the photograph. Such a location made necessary large fills between tunnels passing through projecting points of rock, one such fill across Field's gulch requiring 800,000 yds. of material. With the ex-

Entrance to Tunnel Near North End of Palouse Canyon.

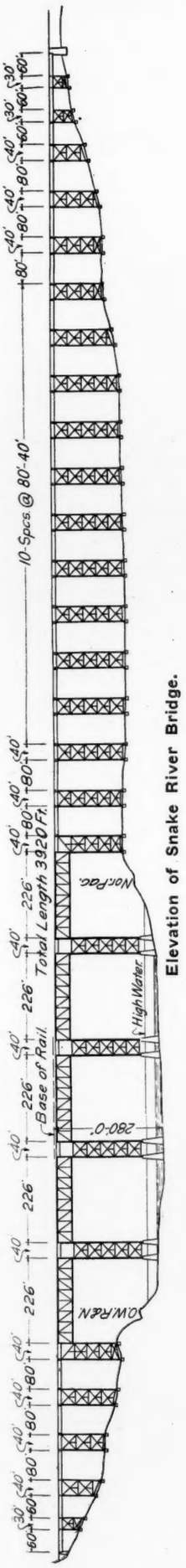
ception of one steam shovel, no heavy equipment was used between Hooper and the Snake river, because of the difficulty of getting it in to the work. Practically all the material is being moved by hand, and a large part of the work is done by station men who take contracts for short sections. Many of the cuts are being taken out by trapping the material into small cars. A small tunnel is driven at grade in advance of the face of the cut and traps are built in the roof through which the material above is loaded into the cars. There are eight tunnels in this section of the work ranging in length from 400 ft. to 1,820 ft. Six of these tunnels are being driven from top headings and two from the bottom. The headings have met on all of the tunnels and they are all practically completed. All other grading is now also practically done.

South of the Snake river the line descends on the maximum grade to the level of the main line of the O.-W. R. R. & N. at Ayer. As this part of the line was located high up on the side hill very heavy work was encountered for a distance of about four miles. The contractor on this work has introduced several unusual methods to handle the material. At one point about two miles west of the Snake river crossing the new line was located a short distance back from the face of a cliff overhanging the O.-W. R. R. & N. track. It was about 50 ft. below the top of the cliff and about 150 ft. above the level of the old track. When the location was decided on, two alternatives were considered for building this piece of the line. A tunnel could be constructed or the face could be blown off and the line built as an open cut. Because of the uncertain character of the material which would be encountered in tunnelling, the latter method was decided on. The contractor then made arrangements to remove the material with one shot, and the railway company detoured its passenger trains temporarily by way of Walla Walla, while freight traffic was diverted over the Northern Pacific line on the north bank of the river. The ties and rail on the old track were then taken up. The contractor placed 13 carloads, or about 431,000 lbs., of ordinary black powder in the face of this cliff and shot it off on the afternoon of August 12, 1911, blowing down over 330,000 cu. yds. of rock. The accompanying views show the conditions at the time the shot was fired and the results. Steam shovels were immediately set at work clearing the old line and trains were running regularly after an interval of but ten days.

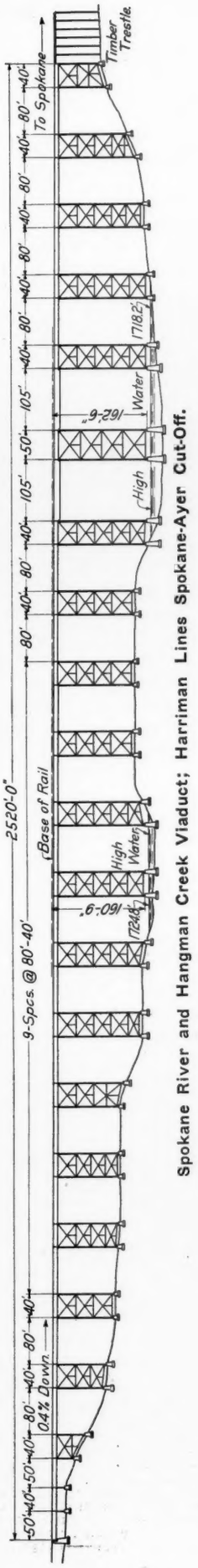
Constructing Embankment by Means of Platform Suspended from Overhead Cableway.

Another somewhat unusual method of construction was followed in making some large fills about a mile further west. Two towers were erected 1,500 ft. apart at opposite ends of a fill and supported a heavy cable between them. One end of a flexible platform was suspended from this cable, while the other end rested on the completed bank. Track was laid from the fill out on this platform and the small cars run out on it and dumped. As the fill was completed the platform was pushed

Effect of Big Blast.



Elevation of Snake River Bridge.



Spokane River and Hangman Creek Viaduct; Harriman Lines Spokane-Ayer Cut-Off.

further out, proper height being maintained by adjustable connections with the main cables. In this way no trestle was required, and no material was buried in the fill. For this span of 1,500 ft. the contractors used seven ¼-in. cables on a side, or 14 cables in all. The fill shown with this arrangement in the accompanying view had a maximum height of 85 ft. and required

Explosion of 431,000 Lbs. of Powder.

300,000 yds. of material. Another fill of 850,000 yds., with a maximum height of 170 ft., and a total length of 2,100 ft., is being made by this same method, which has also been used by this same contractor on other work, including several fills made on the Spokane, Portland & Seattle several years ago.

The roadbed is graded 16 ft. wide on top, except the fill across Field's gulch, which is 185 ft. high, and is built with a 20-ft. crown. Cuts are made 18 ft. wide in rock and 20 ft. wide in earth.

In addition to several smaller bridges, there are three large

Second Crossing of the Palouse River.

structures on this line. The viaduct across Spokane river and Hangman creek in Spokane is 3,000 ft. long, with 175 ft. maximum height. In addition to two 105-ft. spans across the Spokane river, this structure will consist of 40-ft. tower spans, with 80-ft. intermediate spans. The foundation work on this structure has been completed, but no steel work has been erected. An interesting structure will be built at the second crossing of the Palouse, which will consist of a 150-ft. deck Pratt truss with two 42½ ft. girders on the south approach. The truss span will rest on a pier at the south end, and will be hung from a pin connection in the upper chord at the north end. The erection of

this structure will present some interesting problems, for it is desired to erect it as a cantilever from the north end. To do this it will be necessary to construct temporary horizontal and vertical struts under the first panel point of the lower chord and tie the upper chord pins to a very heavy anchorage some distance back from the face of the canyon.

The largest structure on the line will be the Snake river crossing, requiring about 8,000 tons of steel. This will be a viaduct 3,920 ft. long, with a maximum height of 285 ft. The main channel crossing will consist of five 226-ft. deck truss spans supported on intermediate 40-ft. towers. The south approach will consist of one 30-ft., and four 40-ft. towers supporting two 60-ft., and three 80-ft. girder spans. The north approach will consist of 15 80-ft. spans and three 60-ft. spans, supported on 16 40-ft. towers and two 30-ft. towers. It is expected that the shipments of steel for this, as well as other bridges, will commence within 30 days.

About 12,000 yds. of concrete was required for the foundation of this structure, the larger part of which is now in place. At this point the contractors have done a large amount of preliminary work in order to handle concrete expeditiously and economically. False work has been erected from the south bank out into the stream to include the third tower from this bank. On this false work two cranes have been placed, one remaining over the mixer at the shore end, while the other moves back and forth over the piers which are being concreted. The mixer is located on the ground, and the materials are delivered to it from storage bins on the level of the O.-W. R. R. & N. track adjacent. As a batch of concrete is mixed it is picked up by the crane and placed on a small car running on this false work. The crane over the pier places the concrete where desired.

With one exception, all bridges on the entire line will be built in permanent form. This exception is the structure at the crossing over the Connell branch of the O.-W. R. R. & N., at Hooper, and the temporary crossing is built at this point until permanent track arrangements are decided upon.

Corrugated iron pipe is used for all small openings. Ninety-pound open hearth rail is to be laid with Continuous joints on untreated ties. Tieplates are laid on all except joint ties. A large material yard for track and bridge material is being maintained at Hooper, and material for the line is delivered at this point. Track laying will be prosecuted both ways from Hooper, and continued to the Snake river and to Spokane.

This work is being done under the direction of R. E. Strahorn, vice-president and general manager; J. D. Isaacs, consulting engineer; F. L. Pitman, chief engineer, and W. H. Davisson, principal assistant engineer of the third district of the Oregon-Washington Railroad & Navigation, to whom we are indebted for much assistance in the preparation of this article.

Watson, Flagg & Standifer, of Portland, have the contract for the grading work from Spokane to Cheney, while Carlson & Company, of Spokane, W. L. Tribble, of Spokane, Eschbach, Bruce & Company, of North Yakima, Wash., and George Chew, of Spokane, are contractors for the four sections of the grade from Marengo to Ayer. Caughran, Boynton & Company, of Spokane, have the contract for all concrete work.

The railway department of the Formosan government is building a mountain railway that will elicit favorable criticism from the engineering fraternity in many countries. This construction involves steep gradients, sharp curves, a picturesque spiral, and many tunnels and bridges. The entire railway will cover 41 miles, from Kagi to Nimandaira, 7,000 ft. above sea level. From Kagi to Chikutoki, 9 miles, the grade is two per cent. From Chikutoki, Nimandaira is reached after a 32-mile zigzag climb up the mountains to 7,000 ft., the grade being 5 per cent. Nearly the entire line is sinuous, the sharpest curve being 35 degrees. To reach Nimandaira the railway must circle a peak. The spiral construction begins at 1,824 ft. and ends at an elevation of 2,500 ft. Between Kagi and Mount Ari there are 70 bridges, 73 tunnels, and almost innumerable cuts.

TRAIN ACCIDENTS IN APRIL.[1]

Following is a list of the most notable train accidents that occurred on railways of the United States in the month of April, 1912:

Collisions.

Date.	Road.	Place.	Kind of Accident.	Kind of Train.	Kil'd.	Inj'd.
12.	Grand Trunk.....	Wenlock, Vt.	rc.	P. & F.	1	6
26.	Central Ga.	Macon.	xc.	P. & F.	0	10

Derailments.

Date.	Road.	Place.	Cause of Derailm't.	Kind of Train.	Kil'd.	Inj'd.
1.	Norfolk & W.....	Wytheville, Va.	landslide.	F.	1	4
2.	Ill. Cent.	Medon, Tenn.	d. track.	F.	2	4
3.	G. H. & H.....	VirginiaPt.,Tex.	exc.speed	P.	1	11
15.	Denver & R. G.....	Cuba, Col.	loose tire.	P.	0	21
26.	Wabash	Woodburn.	unx.	P.	0	46
29.	C. N. O. & T. P.....	Crittenden, Ky.	.....	P.	0	14
30.	St. L. & S. F.....	Kosoma.	unx.	P.	0	3

In the rear collision which occurred near Wenlock, Vermont, on the 12th, an eastbound passenger train ran into a preceding freight, disregarding the freight flagman's signal. The passenger engineman was killed and six other persons were injured. The mail car was badly damaged.

The train in collision at Macon, Ga., on the 26th, was the southbound Dixie Flyer. It ran over a misplaced switch and collided with some freight cars standing on a side track. The engine was partly overturned. The engineman, fireman and one passenger were slightly injured. The switch had been maliciously misplaced.

The train derailed at Wytheville, Va., on the 1st, at about 5 a. m., was a freight of 22 cars, drawn by two engines. It struck a landslide 10 ft. deep in a narrow cut, and was so badly wrecked that the track was not cleared for 50 hours. One of the enginemen was killed and four other trainmen were injured.

The train derailed near Medon, Tenn., on the 2d, consisted of a locomotive and a caboose, and the cause was the weakness of the roadbed over a stone culvert which had been undermined by high water. The persons killed were the engineman and the road supervisor. These two men were on the engine. Four men in the caboose were slightly injured.

The train derailed at Virginia Point, Tex., on the 3d, was southbound passenger No. 5 of the International & Great Northern, and the engine and tender fell down a bank. The engineman was killed; the fireman, one brakeman, the conductor and eight other persons were injured. The derailment occurred at about 5 a. m. and was caused by entering a crossover at too high speed. It occurred on a track which connects the Galveston, Houston & Henderson with the Galveston, Harrisburg & San Antonio.

The train derailed at Cuba, Colo., on the 15th, was No. 207, the southbound Rocky Mountain Limited of the Rock Island. The day car was overturned and ditched, and the persons injured were nearly all in this car—21 of them. There were no injuries in any other part of the train. The cause of the derailment was the loosening of the tire of one of the driving wheels. This wheel ran off the track at a frog and displaced the switch point; and everything back of this pair of wheels ran off the track.

On the Union Pacific, near North Loup, Neb., on the 25th, a train was overturned by wind, but it had been brought to a stop, and we have not included the case in the list of derailments. It was westbound passenger No. 35. All of the three cars of the train (but not the engine) were overturned. Some of the 29 passengers were slightly injured.

The train derailed on the Wabash at Woodburn, Ohio, on the 26th, was the westbound fast mail No. 5. The cause of the derailment was not determined. The front truck of the tender is

[1]Abbreviations and marks used in Accident List:
rc, Rear collision——bc, Butting collision——xc, Other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, Unexplained——derail, Open derailing switch——ms, Misplaced switch——acc. obst., Accidental obstruction——malice, Malicious obstruction of track, etc. ——boiler, Explosion of locomotive on road——fire, Cars burned while running——P. or Pass., Passenger train——F. or Ft., Freight train (including empty engines, work trains, etc.)——Asterisk, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

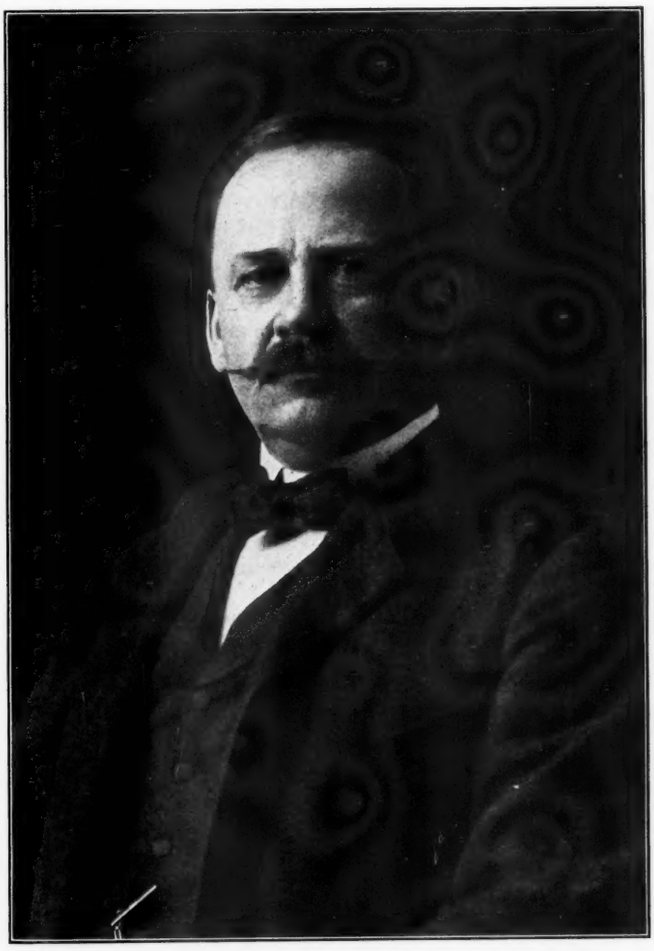
believed to have been the first to run off. Four employees, 7 mail clerks and 35 passengers were injured.

The train derailed at Crittenden, Ky., on the 29th, was the northbound Atlanta special No. 10, and the cause was not discovered. Fourteen passengers were injured.

Electric Accidents.—Of the six accidents to electric cars, reported in the newspapers as occurring in the United States in April, three were attended with fatal results. In Chicago a street car was struck by a freight train, 3 killed, 18 injured; at Lima Center, Mich., one was killed and 20 injured, and at Trenton, Ohio, one was killed and seven injured.

NEW PRESIDENT OF THE GRAND TRUNK.

Edson J. Chamberlin, vice-president and general manager of the Grand Trunk Pacific Railway Company, has been elected president of the Grand Trunk and of the Grand Trunk Pacific, succeeding the late Charles M. Hays. William Wainwright, second vice-president of the Grand Trunk Pacific, has been elected first vice-president of the Grand Trunk Pacific, remaining also vice-president of the Grand Trunk. M. M. Reynolds, third vice-president of the Grand Trunk Pacific, becomes second vice-president of that company, and also remains a vice-president of the Grand Trunk. The new president is quoted as saying that no further changes in the staff are contemplated, except that a general manager of the Grand Trunk Pacific will later be appointed.



Edson J. Chamberlin.

Mr. Chamberlin, who is now sixty years old, was born in Lancaster, N. H. He was educated at the Montpelier Methodist Seminary, and began railway work in 1871 as a timekeeper in the car shops of the Central Vermont at St. Albans. He served as a clerk in the paymaster's office and in the office of the superintendent of transportation, then as corresponding secretary for the general superintendent, and in 1877 became private secretary to the general manager. In 1884 he was appointed superintendent of the Ogdensburg & Lake Champlain and of the Central Vermont line of steamers on the lakes. In 1886, he took charge of the construction of the Canada Atlantic as general manager. The project at that time did not seem promising, the line running largely through a then unproductive territory and being without advantageous connections. Mr. Chamberlin, however, built the road at a cost below the estimates, arranged favorable connections and organized a strong operating staff. He was general manager of the company until 1905, when the property was sold to the Grand Trunk, and remained in charge of it for a year more, acting in the interests of the Grand Trunk. He then went into private business as a railway contractor. He built several lines of road in eastern Canada and then went to Mexico to carry out construction work in which he was interested. In 1909, he returned to Canada as vice-president and general manager of the Grand Trunk Pacific. Although his headquarters were in Winnipeg, he has been coming to eastern Canada frequently and has kept in touch with every branch of the Grand Trunk system.

Mr. Chamberlin is an active and public spirited citizen, as manifested particularly during his long residence in Ottawa when in charge of the Canada Atlantic. He is particularly respected for his ability in bringing out the best in his subordinates, and in building up and directing an efficient organization These qualities, in combination with his wide experience as a builder of railways, eminently suit him for the office he is assuming.

The government of Bolivia has now under consideration the granting of a concession to a Mr. Hoskins, an American, for the construction of a railway between Huaicho and Rurrenabaque; while it is also considering an estimate from another applicant, Mr. Curt Scherteron, for the construction of a railway line from La Paz to the town of Yungas, which, however, is to be carried out on behalf of the government, and to be completed under penalty within a period of four years. The original concession, which was held by Señor Horacio Ferreçio, has lapsed, since he was unable to finance the enterprise. There are two other new railways in this republic, one being from Cochabamba to Tarata and known as the Valley Railway, now in so advance a state of completion that it is to be opened in August or September of this year. Some excellent construction work is being done on the roadway, the bridges and the culverts—of which there are a considerable number, and many of importance—and when finished the line will compare with any to be found in Bolivia. The other undertaking referred to is merely in the projected stage, and is to be between Ferrobamba, where the mines of copper are located, and the coast; it is to be run in opposition to the line which now carries the ores from the mines to Mollendo, by means of the Southern railway, one of the group which is managed by the Peruvian Corporation. It is doubtful whether this Ferrobamba railway will be undertaken, since the construction would prove both difficult and costly.

The Bolivian cities of Oruru and Cochabamba are to be linked up by a railway, and construction has been going on for some time past. According to the terms of the Montes-Speyer contract entered into on May 22, 1907, it was stipulated that the line should be completed and open to traffic within two years from that date. As yet, not more than one-fourth of the line has been finished. According to present calculations another five years will be necessary to complete the undertaking, while the total expenditure will probably total about $10,000,000, which is infinitely more than was contracted for.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.

Particularly Successful Annual Convention, the Well-Prepared Papers Which Were Presented Evoking Valuable Discussion.

The fourth annual convention of the International Railway Fuel Association was held at the Hotel Sherman, Chicago, May 22-25. The opening addresses, which were made by the president, T. Duff Smith, Grand Trunk Pacific; Robert Quayle, superintendent of motive power and machinery, Chicago & North Western; and Walter S. Bogle, president of the Crescent Coal and Mining Company, were reported in the *Railway Age Gazette* of May 24, page 1170.

FUEL AS A FACTOR IN LOCOMOTIVE CAPACITY.

Dr. W. F. M. Goss, dean and director of the College of Engineering, University of Illinois, read a paper on this subject, an abstract of which follows: The power developed by a steam locomotive is derived from the fuel it consumes. Other things being equal, the greater its rate of fuel consumption the greater will be its capacity. The weight of the modern locomotive cannot be greatly exceeded except at the expense of extensive improvements in track or through the adoption of an arrangement of wheels which will permit the load to be much more widely distributed than at present. As it is not likely that the demand for higher power will cease, the problem of supplying it is one of more than academic significance. It presents two possible lines of solution. One is through the better adaptation of fuel to the needs of locomotive service, and the other is through the better adaptation of the locomotive to the requirements of the fuel which it has to burn.

It is obvious that anything which will successfully promote the combustion of fuel in the firebox of a locomotive will operate to increase its power. Every pound of coal effectively burned represents a definite output in the form of power at the drawbar, and if through care in the choice and preparation of the fuel the rate of combustion can be materially increased, it is evident that the maximum capacity of a locomotive may be advanced. This fact is lost sight of when locomotives performing service, in which maintenance of schedule is a matter of great importance, are supplied with coal bad in its composition and which is a mixture of the finest dust with lumps of every possible size. Conditions of service which demand high power will justify unusual care in the selection of fuels. The coal used under such conditions should have a high thermal value, and it should be low in clinker and ash. It should be sized before it is put on the locomotive tender, and if necessary it should be washed and sized. One who looks upon sized coal in a car and then upon a carload of run-of-mine coal and considers that on the grate the combustion of coal can only proceed as air can pass through the bed and around the individual particles of coal, will easily understand the superior advantages offered by the sized fuel. A principal advantage of the briquetted fuel so much used in foreign railway practice is to be found in the fact that the briquettes are of uniform size. When the coal fired is made up of pieces of uniform size, it forms a bed on the grate in which the interstices between the pieces of coal are uniform and the admission of air over the entire area of the grate is in finely divided and uniformly distributed streams. The result is that every part of the fire is maintained in a condition of maximum efficiency; the temperature of the firebox will be higher than when mixtures of lumps and fine coal are fired; the rate of combustion will be greater, and, as a consequence, the capacity of the locomotives will be increased.

It is obvious that the power of a locomotive cannot be increased indefinitely merely through the proper selection of fuel, but the limits of its maximum performance may be materially extended. There are no objections to the general introduction of especially prepared fuel for locomotives excepting those of cost. The fuel bill of the railways is already an enormous one, and those who are responsible will always hesitate before permitting an increase in the purchase price per ton. But the ultimate cost, when measured in terms of service given, will be found in many cases justifiable. Under present practice, railways, in their desire for some increase in power, do not hesitate to increase the weight of their locomotives by giving them larger boilers, by raising their steam pressure, by the adoption of compound cylinders, and by the addition of superheaters. All of these are expensive measures, but they have been justified in practice by the results obtained. The more careful preparation of fuel is to be looked upon as a means to an end. It constitutes an embellishment in locomotive operation and is not different in purpose from embellishments in design. It will add to the expense, but will give a return in increased power which at the head of important trains may be greatly needed for the maintenance of service. I believe that a great opportunity, which as yet has been but little appreciated, lies awaiting the attention of the prophet who will proclaim the gospel of increased power of locomotives through the more careful selection of their fuels. The time is at hand when lump coal will be washed and sized, and when the fine coals will be washed and briquetted. These processes, excepting that of briquetting, are inexpensive and a demand for their employment will soon be forthcoming from the railways.

The alternative plan whereby the power of the locomotive may be increased, is that which provides for a development of its design along lines which will give it greater capacity to consume the indifferent fuels which under present practice are commonly supplied it. What changes need be made in present practice to provide a greater fuel-burning capacity? The first requisite in the development of such a design is a large grate. If a design could now be made which would permit the present maximum grate area to be doubled, several important results would at once be secured. First, while the total amount of fuel burned per unit of time might be materially increased, the rates of combustion per unit area need not be increased, they could even be reduced. The increase of power would be proportional to the increase in the total fuel burned, while the reduced rate of combustion would avoid the necessity for special care in the selection of fuel; would allow the use of fuels now normal to locomotive service; would operate greatly to reduce the loss of fuel in the form of sparks, and would prolong the period during which the locomotive could be kept in continuous operation. For example, when 6,000 lbs. of coal are burned per hour on a 60-ft. grate, the rate of combustion is 100 lbs. per foot of grate per hour, and the spark loss with many fuels represents fuel values which approach 10 per cent. of the coal fired. The collection of ash and clinker on the grate so much impedes the draft as to require a thorough cleaning of the fire after a run in passenger service of from 100 to 150 miles. A greater distance, if attempted, must generally be run at reduced power. With a large grate these conditions are all changed. The burning of 6,000 lbs. of coal on a 120-ft. grate would reduce the rate of combustion to 50 lbs. per foot of grate per hour, and the spark loss to 2 or 3 per cent., and would permit continuous operation for a passenger run of 300 miles between the cleaning of fires.

It is true that the larger grate would be at a disadvantage with reference to losses of fuel on the grate at the end of the run, and in the larger amount required to cover the grate in the process of starting fires; but these would be entirely neutralized by the possibility of increased mileage between the starting of new fires. With the larger grate, only half as many new fires would need to be made per thousand miles run as

were formerly required. While the same total amount of coal is burned in each case, it is evident that the 8 per cent. saving in spark losses would at once be made available as an 8 per cent. increase of power; also that among the possible variations in the method of taking advantage of the presence of the larger grate will be included the possibility of increasing the rate of combustion. For example, an increase in the total fuel consumed from 6,000 to 8,000 lbs. an hour, would increase the power capacity of the locomotive by 33 per cent., and would involve rates of combustion which, judged by present-day standards in locomotive service, would be accounted low. If the rate of combustion were forced to a total of 10,000 lbs., the increase of power would be 66 per cent., and the rate per unit area of grate would still be below the maximum now common in locomotive service. There is, therefore, much to be accomplished by increasing the grate area of a locomotive. If the output of power remains unchanged, it will permit lower rates of combustion, a reduction of spark loss, and the use of inferior grades of fuel. If, on the other hand, the rate of combustion per unit area of grate remains unchanged, the output of power may be increased in proportion to the increase in the area of the grate.

Locomotive grates having an area of 150 ft. or more would necessarily involve some new departures in locomotive design. As the width of such a grate could not greatly exceed 7 ft., its length would need to be from 20 to 25 ft. This may mean a complete abandonment of the existing type of locomotive boiler and the substitution therefor of some new type, but it does not necessarily imply such a change. It does mean, however, the adoption of an articulated form of locomotive which will admit of a space of 25 ft. or more between the two systems of wheels. It should be possible either to increase the spacing of the frames over this space or to drop the frames so low that the firebox and boiler with attachments may have an unobstructed area the full width of the track clearance for all heights 3 or 4 ft. above the rail.

In working out details, automatic stoking must be provided for. This can best be done by having the stokers feed transversely across the boiler from both sides of the firebox. The stokers themselves may be either of the chain belt or of the Roney type, or they may consist of any simple feeding mechanism, delivering to fixed inclined grates. They would be very short in the direction of the fuel movement, probably not more than 30 or 32 in. in length, and they would discharge on a flat dump grate running the whole length from front to rear of the firebox. The aggregate width of the individual stokers on each side would, of course, be from 20 to 25 ft., but they would be split up into as many different units as would best provide for the construction of short arches over them. By such an arrangement, the green coal would pass under the mud-ring of the boiler and under a short arch, where it would ignite. It would gradually be pushed forward toward the center of the firebox to the flat dump grate, where it would be met by fuel coming in from the other side. The inward movement of coal from both sides toward the center of the grate would, of course, proceed throughout the full length of the firebox, that is, for a distance which might be as great as 25 ft. The fact that the ignitions of the fuel would be under an arch would make the combustion nearly or quite smokeless, the mild draft would make the cinder losses small, while the low rate of combustion per unit area of grate, and the provisions for cleaning supplied by the stokers and dump grate, would permit continuous operation at full power for a very long period.

Narrow hoppers supplying these stokers would open up along the whole length of the firebox on both sides to the full width allowed by the track clearances. The operating mechanism of the stokers, which would be beneath them, would be allowed the same total width. An extension of these hoppers upward on both sides to the level of the top of the boiler or higher, would provide space for all the coal necessary for a run. No coal would be carried on the locomotive tender and none would need to be rehandled on the locomotive. It would all be loaded at once into an extension of the stoker hopper, and its weight would be added to the wheel loads of the locomotive.

In the discussions of the preceding paragraph, I have assumed that the general type of boiler employed would not be materially different from that now in service. Difficulties would, of course, appear in the construction and maintenance of a staybolt firebox 25 ft. in length, and whatever the outside form of the boiler might be, some special provision would need to be made in the working out of its construction. A demand for a firebox of such dimensions would doubtless call out various means for supplying it. There would probably be no difficulty in constructing a Jacobs-Shupert firebox of any desired length. The boiler would be so located on the frames of the locomotive that its back-end would be just in advance of the first of the rear system of driving wheels, and a foot-plate carrying all of the auxiliary machinery of the locomotive would extend rearward over the axles of these rear wheels and perhaps over the wheels themselves. A fire door, as usually placed, would supply the fireman an opportunity to inspect his fire, and guided by such inspection he would be able to so control the operation of the several stokers as to maintain uniform conditions throughout the length and breadth of the grate. The barrel end of the boiler would extend out over the forward system of wheels. So much for the arrangements involving a normal boiler. If it should be desired, an attempt could be made to work out the details of the design, using an entirely new form of boiler, such, for example, as a boiler of the water-tube type; but it is not likely that the adoption of any such new type would of itself simplify the general problem as herein outlined.

In conclusion, permit me to say that I appreciate thoroughly the danger of attempting within the limits of a few paragraphs to outline successfully a locomotive design that is entirely new. I appreciate also the many difficulties to be met in applying any such conception. I cannot even claim that I have yet given the matter such attention as will permit me to say that all difficulties are surmountable, but I am convinced that the general scheme is sufficiently promising to justify any study which is likely to be bestowed upon it. My purpose in presenting it is to place before the members of this association in as forceful a way as possible, the importance of larger grate areas in locomotive practice. If the capacity of locomotives is to increase in the future as it has in the recent past, and if locomotives are to be supplied with such grades of coal as are now commonly used in locomotive service, such a change will be found imperative.

Discussion.—The discussion was, in the main, favorable to the methods proposed by Dr. Goss for increasing the capacity of the locomotive, first, by improving the quality of the coal, and, second, by the use of large grates. Comments, stating some objections to the practical application of the recommendations, are given in our editorial columns.

LOCOMOTIVE FUEL PERFORMANCE SHEET.

Robert Collett, superintendent of locomotive fuel service of the St. Louis & San Francisco, presented a paper on this subject in which he described the locomotive fuel performance sheet used on the Frisco and also summed up the replies to a circular letter which had been sent to the members of the association.

A little more than a year ago, the St. Louis & San Francisco decided to try out, on one division of 250 miles, an individual engine daily performance sheet. Formerly a monthly performance sheet had been kept, but this had been discontinued about three years previous, because the information was more or less inaccurate and reached those interested so late that it was not considered worth the expense of compilation.

It was the opinion of the general officer who originated the later plan, that if sufficiently close supervision could be given

to all of the separate features, a correct daily record of each engine's performance could be obtained and that with this information, as well as a knowledge of what constituted good average performance in each class of service, a good idea could be obtained as to what each of the engines were doing and should do in the use of fuel. Accordingly, a daily performance sheet, such as shown herewith was started and sufficient time was spent on one division to get in thorough touch with all the details of its operation. Later the plan was put in effect on all other divisions.

At first all of the compilations were made daily, but it was found that it was not necessary to figure out the number of pounds used per car mile or per thousand ton miles each day, but the tonnage for car miles, fuel, hours of service, and, where the engine made only a single trip, names of engineers, are set down daily and the person handling the report can thus locate unreasonable performance. A recapitulation is made of each engine's performance at the end of 15 days and at the close of each month. This constitutes the daily record, and from this is made, on typewriter, a monthly report, which is the performance of each engine on the division, in each class of service; from the reports from each division a general report is compiled

As a basis for what constitutes good average performance, numerous records of trips have been made, taking every-day conditions and including coal used in getting engines ready for the trip. It was early found by experience that merely taking the daily reports and tickets, as furnished, did not fulfill the requirements, as considerable carelessness was manifested in making coal tickets and making up daily fuel reports, and, by accepting reports as made out, an engine might consume 500 lbs. of coal per thousand ton miles one day and 50 lbs. the next, or none at all. One instance is recalled where an engine was charged with 24 tons of coal during a 24-hour period, while being held in for work; the engine was not fired up during that time, and on this account, of course, other engines

LOCOMOTIVE FUEL PERFORMANCE; COAL AND FUEL OIL

DIVISION _____ MONTH _____ 191__

ENG. NO.		DATE 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	TOTAL & AVG.	DATE 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	TOTAL & AVG.
	Class of Service				
	Pass. Car Miles or 1,000 Gross Ton Miles				
	Locomotive Miles				
	Tons Coal or Gallons Oil Used				
	Lbs. Coal or Gals. Oil Used per Pass. Car or 1,000 G. T. M.				
	Number of Hours in Service				
	Class of Service				
	Pass. Car Miles or 1,000 Gross Ton Miles				
	Locomotive Miles				
	Tons Coal or Gallons Oil Used				
	Lbs. Coal or Gals. Oil Used per Pass. Car or 1,000 G. T. M.				
	Number of Hours in Service				
	Class of Service				
	Pass. Car Miles or 1,000 Gross Ton Miles				
	Locomotive Miles				
	Tons Coal or Gallons Oil Used				
	Lbs. Coal or Gals. Oil Used per Pass. Car or 1,000 G. T. M.				
	Number of Hours in Service				
	Class of Service				
	Pass. Car Miles or 1,000 Gross Ton Miles				
	Locomotive Miles				
	Tons Coal or Gallons Oil Used				
	Lbs. Coal or Gals. Oil Used per Pass. Car or 1,000 G. T. M.				
	Number of Hours in Service				

Individual Engine Daily Performance Sheet; St. Louis & San Francisco.

REPORT OF HANDLING OF LOCOMOTIVES FROM _____ ROUND HOUSE

For 24 Hours Ending Midnight _____ 191____

ENGINE NUMBER	ARRIVED ASH PIT				FIRE KNOCKED				TIME OFFERED				TIME ORDERED				TIME FIRED UP				TIME READY				TIME UNDER STEAM		MECH. DELAY		TRANS. DELAY		REMARKS.
	Day	Hour	Min.	A.M. or P.M.	Day	Hour	Min.	A.M. or P.M.	Day	Hour	Min.	A.M. or P.M.	Day	Hour	Min.	A.M. or P.M.	Day	Hour	Min.	A.M. or P.M.	Day	Hour	Min.	A.M. or P.M.	Hour	Min.	Hour	Min.	Hour	Min.	

AVERAGE DELAY ENGINES UNDER STEAM _____ **Hrs.** _____ **Mins.** _____

AVERAGE MECHANICAL DELAY _____ **Hrs.** _____ **Mins.** _____

AVERAGE TRANSPORTATION _____ **Hrs.** _____ **Mins.** _____

_____ Round House Foreman.

INSTRUCTIONS

This report must be made out the first thing every morning, sending a copy to Master Mechanic, Superintendent and General Superintendent.

This report is to cover all engines handled. They should be separated on the report; that is, all passenger engines should be shown together, then your preferred freight power, then chain gang and then switch. Engines tied up for more than 24 hours' work are not to be charged under Mechanical Delay.

When Round House Foremen require 2 hours' notice, transportation delay does not begin until two hours after engine is offered. For instance, if offered at 4:00 P. M. for 6:00 P. M., there is no transportation delay, but if ordered for 7:00 P. M. there would be transportation delay of one hour.

Special Terminal Report on Locomotives; St. Louis & San Francisco.

were not charged with the actual coal they received. This instance is mentioned to show the close attention necessary to be given this feature. The clerks or fuel foremen, handling daily fuel reports, do not always realize the importance of correct information.

It is a hard matter to convince the average person handling fuel station reports that it is not necessary for him to arbitrarily change the amount shown on the ticket in order to keep his balance somewhere nearly correct, but that the matter should be regulated with the party delivering the fuel to the locomotive. Likewise, it was found difficult to reconcile the average ticket furnished by the engineer with the amount of coal delivered to the engine as shown by scale weight, although the coal might be weighed immediately before being placed on the chute. The fact that this distribution requires such close supervision makes a daily record, in our opinion, desirable.

If performance sheet is kept, is it an individual engine record or engineer's record of fuel consumption? Replies indicate that one method is in use about as much as the other. Some members prefer both the engineer and engine record and are handling it in this way. Our opinion is that the engine record is preferable to the engineer's record, for the reason that we should have tickets to cover the individual trip. In freight service it sometimes happens that the engine will be handled by more than one crew in going over the division, and it is not possible to separate the fuel used by each crew; again, an engine may run over more than one division, handled by two separate crews, not taking any fuel at the intermediate terminal. Where engines are manned by regular crews, this report practically becomes an engineer's record also.

While the operation of the engine does have a great deal of bearing on the fuel consumption, the condition of the engine also is important and where it is necessary to rely to some extent on the engineer's estimate, as at chutes where a night force is not employed, the engine record, we believe, best serves the purpose. The waste due to the condition of the engine is apt to be as great as that due to improper operation, and it is necessary to have the enginemen's co-operation in obtaining this information, both as to the condition of the engine and the amount of fuel used, while the waste due to improper handling or firing is more a matter of education through personal contact than through the medium of the performance sheet. The least skillful man is most likely to give a short ticket or cultivate the good will of the chute tender, to the engineer's advantage perhaps and to the discredit of another man who is really more economical in the use of fuel. Whereas, if it is an engine record, for each division, it reflects to a large extent the condition of the locomotives and is for, or against, the division mechanical officers. One division cannot be altogether checked against another division, but records of service tests on that division should also be used for comparison.

What is your opinion as to separating the fuel used at the terminal from that used on the trip? The opinion of those replying were almost equally divided, many objecting to the accounting necessary to separate the charges and taking the view that as it must necessarily all be charged to locomotive operation, nothing could be gained from the separation. A great many thought it unfair to charge crews with the fuel used at the terminal over which they had no control.

We do not attempt to separate the fuel used in firing up the engine from that used on the trip, but do undertake to give credit for the fuel used over and above the amount required to fire the engine up and which may be consumed by lack of facilities or other causes. This has been taken care of by a special terminal report, which has taken the place of a report formerly used to show the time engines were in terminal and the mechanical and transportation delays. This has been changed to include the time that engines are held under steam at terminal. All time in excess of three hours that the engine is fired up is shown as terminal delay and credit is given on the basis of a certain number of pounds per hour. This amount is deducted from the fuel used by all engines.

What methods are used to interest enginemen in economical performance? Class meetings are held on the different divisions, as often as convenient to interest the enginemen in fuel economy. They are not only attended by enginemen, but others who may care to attend, together with all of the officers that can be present. All points involved are discussed freely, suggestions and criticisms are invited, and division and system performances are gone over, so that all may be advised of the progress being made. Separate educational meetings are held with the firemen. While special effort is made to have the accounting as correct as possible, we depend more on personal contact than writing to the enginemen to obtain results. On divisions where the crews have regular engines, mimeograph forms are sent out at the close of each month, advising the engineer of the amount of coal consumed by him and the pounds per passenger car mile or the pounds per thousand gross ton-miles for freight trains and the average for all engines in that class of service. Information from the daily performance sheet is furnished the proper officers, who take the matter up personally with the crews. Crews are also complimented by letter for good performance where it comes under the personal observation of master mechanic or assistant superintendent locomotive fuel service; copies of these letters are frequently attached to the enginemen's personal record. Monthly bulletins are posted by the superintendents calling attention to what has been done on their respective divisions as shown by the division fuel statement, thus encouraging renewed effort.

Do you consider the extra expense of scales in mechanical chutes advisable? The majority of the replies indicated that scales are not in general use, about one-half favoring their use in connection with the fuel performance sheet, and several advising that experience with scales had proved unsatisfactory.

On our lines there are a number of mechanical chutes, only two of which are provided with scales; also several gravity chutes holding from 200 to 300 tons, with no means of measuring the coal delivered to each engine; a few pocket chutes which have been calibrated and stencilled in ton measurements; several locomotive cranes and at some points we shovel direct from the car to the engine tank. Our experience has been that the most accurate distribution is by using the billed car load weights as a guide, taking the fuel foremen's or hostlers' estimate, and requiring them to observe the space in the tank. We find they become very familiar with the amount of coal that is required to fill a given space. All coal is weighed on our railway track scales after leaving the mines and special attention is given the feature of correct weights. Fuel oil tanks are provided with calibrating rods, stencilled in gallons. We do not use meters at our fuel oil stations. On a recent 30-day test of a Mallet locomotive, the hostler's estimates of coal taken from a mechanical chute at one end of the line and a fuel foreman's estimates at an intermediate pocket chute station, showed a difference of but 1.22 tons when compared with the amount recorded by the man making the test. This case is unusual, but serves to illustrate that a reasonably correct charge can be obtained.

In the opinion of the writer, scales are not necessary at terminal points, unless engines of foreign lines are to be coaled. Our observation leads to the belief that unless the person assigned to that duty has nothing to do but look after the scale, or if a large number of engines are handled, the weighing is apt to resolve itself into guess work, due to certain engines taking coal and the chute men not being at the scale at the time.

At intermediate coaling stations, if the chute is located at a pumping station where a night man is employed, or if there is enough work to justify the employment of two men to operate the chute, I believe the scale is desirable, as it does not rep-

resent any additional cost for operation and gives a better distribution than that made by relying upon the engineer's estimate.

We do not undertake to include an adjustment in the performance sheet for the difference between coal chute measurements and the billed weights, but make a special effort to have the amounts shown tally as closely as possible with the fuel actually used. All concerned know that it is to their interest to have this shown; for if all the fuel used is not charged in any particular month, it will be reflected in the poor performance the following month when the error has been corrected.

The work on each division is under the direct supervision of the assistant superintendent locomotive fuel service, who formerly held the position of road foreman of equipment and who has practically the same duties, giving special attention, however, to the matter of fuel economy. The number of engines assigned ranges from 70 on the lightest to 130 on the heaviest division.

The handling of the performance sheet requires the services of one clerk for each division, and unless the division is a very heavy one, he can also handle the correspondence.

No extra expense is incurred in procuring data on tonnage, car miles, hours of service, etc., this being furnished on the report made up in the despatcher's office for the car accountant's records.

Too much emphasis cannot be given the matter of correct distribution. No greater mistake can be made than to assume, with the posting of a bulletin requiring correct fuel tickets to be made out or the installation of weighing or measuring methods, that the problem of distribution is solved. A little first hand experience will soon dispel this illusion. Nothing will cause an engineman to lose faith in a performance sheet more quickly than to find that some person handling the fuel report is changing tickets to suit his own convenience, while on the other hand, a sincere effort to give every one a square deal will meet with a very hearty response.

Some details which have had an influence in keeping up interest and also helped reduce the fuel bill, are as follows: Weekly reports submitted by the fuel inspectors on the condition of the flooring of coal cars placed for loading at the mines; a monthly report showing the diameter of the exhaust nozzles of each engine; a crusade on the overloading of engine tanks at coaling stations; waste at the coal chutes, and deck guards on engine tanks to prevent the coal wasting at the gangway.

Discussion.—There was considerable opposition to a performance sheet which would include the engine only and have little reference to the performance of the engineer and fireman. Some members thought that with a little addition the men's part of the work in saving coal could be included on the same sheet which shows the engine performance.

The second form which the report recommends relates to the time occupied at terminals, and gives the average delay of engines under steam due to the mechanical department and that due to the transportation department. Although such a form is not generally used, it was favorably considered, and the statement was made that while in some instances an hour and a half to two hours are required to clean the fires, good work on the part of the engineer and fireman in coming into the terminal with a light fire, and good work on the part of the men at the ashpit, would reduce this time to less than ten minutes. R. Emerson took the position that locomotive fuel performance sheets as made by the railways of this country are of very little use, as they are not at all accurate, and, in order to be of some value, they should be accurate within 1 or 2 per cent., which is very far from that attained by any at present.

ANTHRACITE COAL FOR LOCOMOTIVE FUEL.

T. S. Lloyd read an extensive paper on this subject, an abstract of which follows: Because of the limited supply (the entire anthracite production for all markets is less than the total consumption of fuel by all the locomotives of the United States), there can be no general introduction of hard-coal by the railways of this nation, even for their passenger locomotives. The roads of the anthracite region must long continue to have the advantage over those of other sections of the country in this respect.

For use in and near large terminals and cities, however, very serious consideration is merited in favor of this fuel. The only alternatives to its adoption are: The continuance of soft-coal, with the usual attendant smoke and popular clamor; the substitution of coke, which is harder to burn than anthracite, and also higher priced and limited in quantity and locality of production; the possible future use of briquets as in Europe; the substitution of oil, or electrification.

Briquets have yet to prove themselves, against the relatively cheap coals of this country; but their ultimate introduction on a large scale in locomotive service here seems certain. The most successful and extensive use of a briquet so far in America, has been of one made from anthracite culm.

Oil, while being in most respects an ideal fuel, except for its destructive effect on firebox sheets, and while now used extensively and economically on locomotives in the southwest, is practically out of the question for urban use elsewhere, because of the limited supply and of the vast extension of the demand for it in refined form for the hundred thousands of automobiles today and of air-craft tomorrow, making the price for the crude, basic petroleum, prohibitive for extensive railway use.

Freedom from smoke and cinders makes anthracite an ideal fuel generally, and especially in the neighborhood of large cities. The small amount of inoffensive gas from a few hard-coal burning locomotives is unobjectionable. The only questions are as to its adaptability to locomotives in present service at the different cities, and as to its cost.

About half the locomotives causing smoke near large cities are in switching service. It is well known that the draft on a yard engine is usually not heavy, and therefore, the yard locomotives in present use could almost without exception be adapted for anthracite by changing the grates only. The lower priced, small sizes of coal can be successfully used.

Almost all of the freight and passenger engines now built have quite wide fireboxes, the narrow fireboxes rapidly being retired to small branch-line service or to limbo. The wide boxes have a grate area sufficient to burn a mixture of anthracite and bituminous coals with a full head of steam while in the city and suburbs, and such a mixture properly fired, is practically smokeless.

As a practical method of firing on lines running in large cities, I would suggest on going out:

1. Cover over a brightly burning soft-coal fire with anthracite, preferably pea.

2. Place enough hard-coal in the forward part of the tender for feeding through the city and suburbs.

On coming into the city:

1. Load the necessary supply of hard-coal in the back of the tender at the last preceding coaling station, or at a special small anthracite coaling station 10 or 20 miles from the terminal, perhaps at the first suburban stop, or

2. If the distance does not exceed 10 or 15 miles, and the grades do not require too much work, for the fireman to be trained to prepare in advance a heavy soft-coal fire, and gradually let it burn down, so as to enter the city with only the lightest charging of coal by careful placing of small scoopfuls.

If the locomotives engaged in suburban, transfer and yard work alone were arranged to consume anthracite for fuel the abatement of the smoke nuisance would be so pronounced, it would mean practically abolition, as far as concerns that emanating from locomotives. If the gases, and more particularly smoke from locomotives using bituminous fuel, are as destructive to property and goods in business houses as claimed, it should accentuate the importance of at least a trial of hard-coal.

Having had long experience on both hard and soft-coal roads, I recommend for your earnest consideration this possibility of a use of anthracite for locomotives in spite of its higher cost, as an offset to the propaganda for electrification, particularly in the present unstandardized condition of electric construction and operation. Urban electrification, from the only sufficiently large installation yet attempted (at New York City), is now known to be prohibitive—to require hundreds rather than tens of millions of dollars, for any of a dozen large terminals in this country—and to yield a minus quantity in a net operating economy over all charges, without offsetting increases in revenue.

The employment of anthracite on trains, etc., will not only entail certain inconveniences, but also materially augment the cost of fuel for locomotives, and this will naturally not be a welcome proposition to the stockholders and managements of railways already facing advanced costs of raw materials and manufactured products purchased, wage increases, etc., besides further embarrassment resulting from the exactions of federal, state, and municipal commissions and inspections, without any allowance for compensating increases in rates. The use of hard-coal on locomotives in cities is suggested as worthy of serious consideration to abolish the smoke nuisance, therefore, chiefly as an offset to the unreasonable demand for electrification, which, as stated, would involve prohibitive additions to capital outlay, and annual interest charges thereon—unless, of course, the municipalities would finance the change themselves, since it is exclusively for their benefit; leaving to the railways only the costs of repair and operation.

The paper also gave tables, statistics, diagrams and maps relating to coal production, maps showing the occurrence of the anthracite, and the proportion of coal produced by the different railway companies.

Discussion.—On the Lehigh Valley anthracite coal is used rather extensively, but is almost always mixed with bituminous coal. In passenger service about 60 per cent is bituminous, in freight service about 40 per cent., and in switching service about 20 per cent. Statistics show that about 5 per cent. of the locomotives in the United States now burn anthracite coal, and about 5 per cent. burn oil.

FUEL ECONOMY.

D. C. Buell, chief of the educational bureau on the Union Pacific, Illinois Central, Yazoo and Mississippi Valley and Central of Georgia, presented an individual paper on the Proper Method of Firing Locomotives, in which he covered, more or less thoroughly, the entire field of fuel economy. The following abstract omits that portion of the paper which gives the detail instructions for proper firing.

Is it not fair to assume that the reason we fail to get better results along the line of attempted fuel economy on railways is due to the fact that we have been working along the wrong lines? Is it too much to admit that our efforts are not based on sound principles, and that we need to discard the old and begin anew to work out this problem on basic principles, the following out of which must, from the nature of things, bring results?

Drastic measures seem to be necessary, and if statements in this paper appear harsh or radical it should be remembered that the object is not to criticize present practice, but to cause an awakening as to fundamentals—the better understanding of which will be necessary before any great improvement over present practice can be expected.

The army of combustion experts who are fighting for fuel economy center their attacks on the locomotive fireman. Books, lectures, chemical demonstrations, road demonstrations, premiums, bonuses, and a thousand and one other things, are hurled at the fireman in a vain endeavor to make him burn the fuel more economically. Nevertheless the proper firing of a locomotive is an art known and practiced by but a small percentage of the locomotive firemen of today. The onslaught on the fireman has been so fierce, that in the smoke of battle many of those attacking this problem have entirely lost sight of the fundamentals which are beyond the control of the fireman, and consequently cannot be remedied by him. The proper training of the fireman to fire according to correct principles of combustion is but one of the steps leading to the solution of the problem of fuel economy on a railway.

Proper Grade of Fuel.—The officers of most roads have recognized the importance of a knowledge not only of the heat value per pound of the different grades of fuel available on their roads, but also of other properties of coal, such as whether it clinkers, how much ash it contains, its coking or caking properties, etc. Still another factor is determining what grade of a certain coal can be used most economically; that is, whether it is more economical to use mine-run, or the higher priced screened coal. The traffic department and the operating department must be consulted to make sure that, as far as possible, the interests of the company may be served well in the selection of the fuel to be used. The dependability of the mine in working steadily and turning out a uniform grade of fuel is also a factor. After the proper grade or grades have been determined they should be regularly used so that locomotives may be properly designed and drafted to burn the fuel furnished them economically; and so that the men can familiarize themselves with the proper handling of the class of fuel furnished to them.

Inspection.—Proper inspection of coal at the mines is just as essential as the inspection of locomotives or cars built for the company. Inspection should be made for both quality and weight.

Distribution.—The economic distribution of the fuel from the mine to the point used is one of the big items of fuel economy. I venture the assertion that on roads where this matter is not carefully handled, as much money is wasted through this channel as by improper firing. It is an operating matter pure and simple, and deserves a most careful study. A few years ago, J. G. Crawford, of the Burlington, worked out very complete statistics along this line and presented his results in a paper before the Western Railway Club.*

In this connection the direction of the volume of traffic must be considered, so that the company coal can tend to balance the tonnage instead of throwing it further out of balance. Other factors are the reduction of mileage of empty coal cars, the tonnage that can be hauled over ruling grades, etc.

As an example of what can be accomplished, it has been found economical on one of the transcontinental lines to haul a large quantity of company coal from mines in the far west to eastern terminals, and store it there for a time, the reason being that at certain seasons the traffic is almost entirely westbound. Then coal cars are needed east. These cars can be loaded at the mines, hauled east by power that otherwise would run light; the coal can be unloaded and stored and the cars released where wanted; all at an expense that is negligible compared to what it would cost to keep those eastern terminals supplied at a later season when the traffic was nearly balanced or heavier eastbound.

Coaling Stations.—There is an astounding variation in the cost of coaling locomotives. Cost may vary from two or three cents a ton at a modern link-belt station, to 25 or 30 cents a ton at some more primitively equipped plant. One road that I know of arranged with a company that makes a specialty of erecting coaling stations to finance the erection of a number of stations on its line. This road in a short time saved enough on the cost of coaling engines to not only pay interest on the capital invested for them, but to pay the principal as well.

It is safe to say that a master mechanic or road foreman in territory where this item of cost has not been carefully supervised could save more money, save it more quickly and make the saving permanent, by reducing the cost of coaling engines than by a campaign among his firemen.

Waste at Terminals.—It is ridiculous to talk fuel economy to a fireman, when the road foremen, roundhouse foremen, or mas-

*See The Railroad Gazette, January 10, 1908, page 49.

ter mechanics will allow them to bring engines in from a trip with a ton or more too much of unburned fuel in the firebox—practically all of which is wasted when the fire is cleaned; and when, at this same terminal, hundreds of pounds more fuel are wasted keeping fires in engines that are allowed to pop off around the yard or in the engine house, or in rekindling fires. Such little economies (where they are economies) as the kindling of fires with oil and shavings make the fireman realize that coal is a valuable commodity, and set him thinking about how he can save some.

Condition of Locomotives.—There is nothing more discouraging to a good fireman than an engine that will not steam properly. But a poor steamer seems to have some hypnotic effect on a poor fireman or a new man that not only causes him to forget everything he has ever heard or known about the correct principles of firing, but suggests that he is no longer a fireman—merely a coal-heaver—and he acts on that suggestion. The average man, overtaken by the feeling that he has a good excuse for making a failure, fails with ease. The man to heed fuel economy talk is one who knows that the boiler plant of his locomotive is in good condition.

Stop Steam Leaks.—It is folly to delude ourselves into thinking that the fireman of today is stupid or weak-minded enough to listen with attention to either orders or pleading about economical firing when the engine he fires wastes more steam than he wastes coal. The waste of steam mentioned in this connection includes not only the steam that is wasted past piston and valve glands, packing rings, valve rings or seats, etc., but that steam which is wasted from poor valve setting, excessive engine friction, etc.

Accounting.—The accounting for fuel on most roads is a joke. There are but few, if any, of you in this room, connected with the motive power department of a railway who do not know of the pencil adjustments made every month at each coal chute to balance the tons of fuel charged against that point. This adjustment has become such a common-place affair that the engineers and firemen know of it. Then how can we command their respect if we talk about proper firing of an engine to produce fuel economy, when they know that we can't come within from 50 to 300 tons per month of balancing our fuel accounts at different coaling stations?

Common Sense Statistics.—How do you know whether or not a fireman is firing economically? What statistics have you to prove it? Our ideal is maximum work at the drawbar with a minimum number of heat units. Our performance sheets at the best show only inconclusive comparisons. Pounds of coal per thousand ton miles on a water level division and on a 2 per cent. are totally different propositions; and even comparing the same class of engines on the same run we fail miserably because we have no accurate method of checking the amount of coal issued to an engine, nor of knowing the amount left on the tank at the end of the run. Neither do we credit the fireman with the coal consumed while the engine is at the terminal.

On some roads every one of these items is receiving careful attention and good results are being accomplished. It is probably safe to say that on every road one or more of these items is the particular hobby of some officer and, therefore, is closely watched.

My object in calling attention to this matter has been to defend those hundreds and thousands of loyal men who are daily striving against staggering odds to get their firemen to fire locomotives properly. The reason that road foremen, master mechanics, fuel experts, combustion experts—call them what you may—have not been able to get permanent results has, to my mind, been due in most cases to the overwhelming odds they have had to work against.

Proper Firing.—The proper method of firing a locomotive is the logical method for all firemen to follow, for the simple reason that it is the easiest, the least laborious, and most satisfactory method. If an engine is fired properly there are fewer scoops of coal to be handled, little or no necessity for using the rake or slicebar, or of cleaning the fire; and the shaking of the grates is reduced to a minimum. In addition to this, an engine that is fired properly steams, unless there is something radically wrong with the engine, or the coal is devoid of heat units. But even in such a case proper firing produces the most steam possible under the conditions; and the fireman may safely feel that no one could have done better than he did under the circumstances.

Educating the Fireman.—So far as I know there are only three ways by which firemen can be brought to a realization of the importance of the subject and lined up so as to actually fire their engines properly, even when not under the eye of some one in authority. The first of these methods is by personal instruction and demonstration right on the deck of the engine during a trip. The second is a combination of instruction by lectures, or otherwise, at the terminal and an accurate check of performance by an observer on the engine. Both of these methods are, comparatively speaking, expensive, and both require considerable time in which to accomplish any appreciable results.

The third method is by offering premiums or bonuses to enginemen and firemen for economy in the use of fuel. This method, however, is as a rule unsatisfactory on account of the lack of a proper system of accurately checking the results. The plan in practice seldom is fair and this causes dissatisfaction.

With all due respect to those advocating other methods I must say that my experience has been that such other methods accomplish only the minimum in the way of results. Their only recommendation is that they keep the subject alive and that in some cases they are so economical that if they do any good at all they more than pay for themselves. Classed in this latter category are combustion lectures, circulars and bulletins, instruction books, etc.

The ideal plan is to have a bright young engineer or an experienced fireman appointed as traveling fireman. Each traveling fireman should be able to handle successfully about a hundred engines, if not spread over too wide a territory. These men should not be assigned permanently to one particular territory, but should be moved from division to division or from district to district about once in 30 or 40 days so that they will be kept wide awake by the new surroundings and new problems they meet; and, in addition, so that they won't get calloused to improper local conditions, nor so well known to the engineers and firemen that familiarity will breed contempt for their instruction. These men should be more or less familiar with the principles of combustion, should be able to take the scoop away from the fireman at any time or place and fire the engine successfully, and should be able to explain, and in simple language, the principles they recommend and demonstrate. There are many such men in engine service on every one of our railways today.

With a crew of this kind reporting to the general road foreman of engines or to the superintendent of motive power of a road which is awake to the other conditions required to produce the ideal of fuel economy, such a crew of men should be able to pay a yearly dividend on the investment represented by their salary and expenses of from 500 to 1,000 per cent. or more.

The second plan that can be worked out successfully is through the agency of a first-class fuel man, who understands thoroughly the practical side of locomotive work, and in addition is well posted on the theory of combustion and the science of fuel economy. This man should be able to handle the problem on a road having not over 750 engines. He should be a good talker, should be equipped with statistics, charts, stereopticon and lantern slides, and perhaps with a very simple chemical outfit for demonstrating purposes, and, if he is right up to date, with moving pictures. He can be furnished with a car if extra equipment is available; or he can cut down his outfit and simply travel from roundhouse to roundhouse. He should have sufficient official standing to command the respect and co-operation of road foremen and master mechanics. Arrangement should be made so

that all firemen would have to attend his talks at least once every 60 days.

This much alone, however, will not accomplish the desired results. He should have under him two or three bright apprentice boys equipped with a little pocket counter, a pail, and a small spring scale. He should keep these boys on the road all the time riding engines. The duties of these boys would be to count and keep record of the number of scoops of coal fired between stations. By means of the pail and scale and a little horse sense they could weigh four or five test scoops of coal to determine the average weight per scoop of coal fired. The boys' records should include the engine number, names of engineer and fireman, the kind of coal, number of cars in the train, the tonnage of the train and the weather conditions, and alongside the column showing station names and the number of scoops of coal fired, the time of leaving, arriving or passing the stations, including a record of the time the engine was standing at intermediate stations. The record should also show the number of times the engine popped off and approximately the number of minutes the pops were open; and, in addition, the number of times the grates were shaken, a record of the use of the rake or slice bar and memorandum of anything out of the ordinary regarding the condition of the engine or the method or running or firing it.

The fuel man, with these boys assisting him, is now in a position to have an accurate up-to-date check of actual performance to use in connection with his talks and demonstrations. From the very first the records that the boys obtain show up conditions that get both engineers and firemen interested. The data collected soon show that some men are going over the road and shoveling several tons less coal than other men, and the knowledge of proper methods gained from the lectures combined with a determination to do as well as the other fellow starts more men to firing according to correct principles.

The reason why both of these plans are successful is that both demonstrate to the fireman that the proper method of firing a locomotive is the easiest and least laborious method for him to follow. It seems impossible to make him believe this by talking alone, no matter what arguments you bring to bear.

When conditions do not permit either of these plans being put into effect and the premium or bonus plan is not considered practical, about all that remains to be done is to put as forceful a circular or instruction paper as can be written on the proper method of firing, letting master mechanics and road foremen follow the matter up as thoroughly as time will permit.

There are, of course, special cases where other methods may be worked out; for example, the moving pictures are to be used by the educational bureau on the Central of Georgia for the instruction of the colored firemen. It is also the intention of the Union Pacific Educational Bureau to put a plan into effect to break in the new firemen that are hired on the road as we now do men entering station service—the method would be a combination of class-room instruction and student trips on the road, both under the supervision of an experienced instructor. This method of breaking in will take no longer than the present method but should start the man in with proper ideas and correct habits instead of in the present hit or miss fashion.

An appendix to Mr. Buell's paper contained the instructions for firing with oil which have been issued by F. F. Gaines, superintendent of motive power of the Central of Georgia.

Mr. Buell's paper was illustrated with stereopticon views, including a large number of moving pictures which admirably brought out the effect of good and bad firing on the production of smoke. The presentation of these lantern views occupied a large part of Thursday afternoon's session. Some of the moving pictures represented two freight locomotives hauling a heavy train over quite a distance on a grade. Views were taken with the camera on a car ahead of the engines so as to show the engine from the front, and others were taken from a rear car to show the amount of smoke which is made by bad firing and to the annoyance of passengers in the observation car. Other moving pictures showed the firemen actually at work, one of them firing properly and the other producing lots of smoke by bad work.

Discussion.—H. T. Bentley, assistant superintendent of motive power and machinery of the Chicago & North Western, regarded the paper of so much value that he thought it should be printed in a separate pamphlet for use by the railways. He thought it was necessary also to educate the engineer as well as the fireman, as different methods of operating the locomotive which are under the control of the engineer affect the coal economy, and the engineer should be instructed to use the best methods of engine operation. The traveling public and those who occupy the observation cars are critical in regard to smoke conditions and are demanding better service on the part of the enginemen. Having paid for a ticket to insure a comfortable ride, it is necessary for the railway to do whatever is possible to prevent smoke from trailing along and behind passenger cars. It was, therefore, a serious duty of the Fuel Association to see that passenger engines especially are fired with as little smoke as possible.

W. H. Averell, assistant to the general manager of the Baltimore & Ohio, said that during the past year that road had made some effort to economize fuel. Five supervisors of locomotives were working along lines almost identical with those recommended by Mr. Buell, with very favorable results. The total saving in coal during the past year was about 12 per cent., as compared with the previous year. Not all of this, however, was due to better firing. Some of it should be credited to the large new engines that have been put in service, and some to increased train haul, but the larger part was due to the better education of the enginemen.

Reference was made to the effect of the shaking of grates on the fuel consumption and the time occupied in cleaning fires at terminals and on the line. A representative of the Missouri Pacific stated that that road had introduced the methods recommended by T. E. Adams of the St. Louis Southwestern, and had succeeded in operating engines over a division of 147 miles without shaking grates or dumping the ashpan. The time required for cleaning fires was reduced from 47 minutes to 17 minutes.

LOCOMOTIVE DRAFTING.

H. B. MacFarland, engineer of tests of the Atchison, Topeka & Santa Fe, presented a paper on Locomotive Drafting and Its Relation to Fuel Consumption. This paper makes up a pamphlet of 85 pages, and records the results of tests of draft appliances of all classes of engines on the Santa Fe. It gives tables and diagrams showing the maximum and minimum draft, the exact pressure and the back pressure expressed in horse power for speeds of 10, 15, 20 and 25 miles per hour. In the case of some of the Mallet locomotives this back pressure amounts to over 1,000 h. p., but in all cases the high back pressure is in connection with oil-burning locomotives, where the ashpan is considerably restricted and a high blast is necessary for the oil burning.

The figures relating to the enormous amount of power to produce the draft in locomotives are rather surprising, as it amounts in some instances to from 800 to 1,000 h. p., which is more than the average useful work performed by most locomotives. For coal-burning locomotives the maximum power reported is 590 h. p., in connection with a 2-6-6-2 Mallet compound freight engine. An abstract of the concluding portions of the paper follows:

General charts have been prepared and are presented to show the relation between back pressure horse power, the indicated horse power and the drawbar horse power. The observations were taken from actual tests made on different types of locomotives, both in freight and passenger service, both coal and oil burners. These curves are plotted with horse power as ordinates, and miles per hour as abscissae.

The chart shown in Fig. 1, was prepared from data secured in the test of a single expansion Mikado type locomotive in

mountain service between La Junta and Trinidad, Colorado. The full line curves show the back pressure horse power, indicated horse power, drawbar horse power and the mean effective pressure.

Assuming an exhaust pressure of 4 lbs., the back pressure horse power is shown with a dotted line. The difference then, between the dotted line and the full line curves, is the horse power to be gained, if the exhaust pressure could be reduced to 4 lbs. This reduction in back pressure would increase the

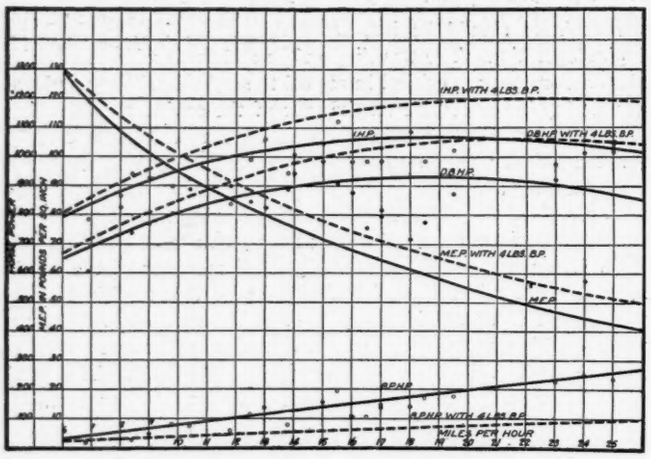


Fig. 1—Chart of Performance of Mikado Locomotive.

mean effective pressure an equal amount. This increase is shown by a dotted line curve.

Since we have supposed that the mean effective pressure is increased, then the indicated horse power would increase to an amount equal to the gain in back pressure horse power. Then, assuming that the machine friction of the locomotive would not increase with the reduction of back pressure, we have with the drawbar horse power an increase equal to the increase in indicated horse power. A dotted line also shows these results.

This locomotive, which is a coal burner, shows very favor-

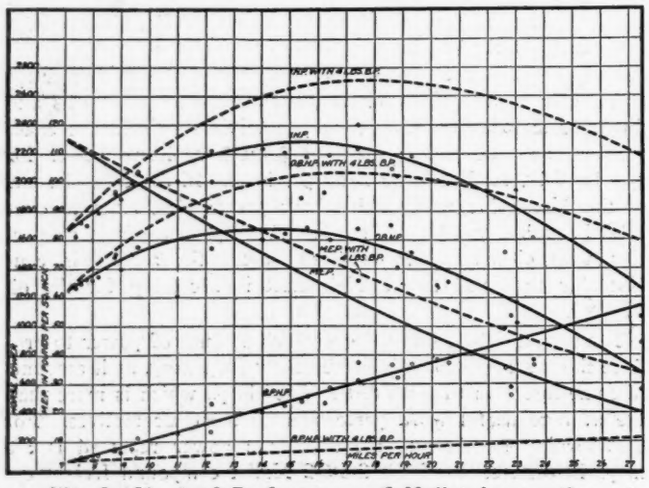


Fig. 2—Chart of Performance of Mallet Locomotive.

able conditions of operation so that the actual gain is relatively low. The maximum speed shown is 26 miles per hour. The back pressure horse power at this speed is only 270, which is 32 per cent. of the drawbar horse power, and 26.5 per cent. of the indicated horse power. In comparison with conditions on other locomotives these figures are considerably below the average and indicate very favorable performance of this locomotive.

The chart presented in Fig. 2 has been prepared in similar manner to the preceding one and shows the performance of a locomotive of the Mallet type. This is an oil burner in heavy mountain service. A study of this chart will very readily show that the increased tractive horse power, due to the decrease in back pressure is very great. In this case the back pressure horse power and the drawbar horse power curves cross each other at a speed of 24.5 miles per hour, the power for drafting at this speed being equal to the effective work obtained at the drawbar. The maximum drawbar horse power is reached at a speed of 14 miles per hour, the back pressure horse power at this speed being 400, and the drawbar power 1,680.

If we assume a back pressure of 4 lbs. at a speed of 14 miles per hour, the drawbar horse power would be 1,960, and the back pressure horse power only 100, or the back pressure would then be 5.0 per cent. of the drawbar horse power instead of 24.0 per cent. The indicated and drawbar horse power decreases very rapidly at speeds above 14 miles per hour, and at a speed of 28 miles per hour the back pressure horse power and indicated horse power curves would come together at 1,200 and the drawbar horse power would be about 600, or 50 per cent. less than the back pressure horse power.

It can very readily be seen that the reason for the Mallet locomotive being a low speed engine is not due to machine friction,

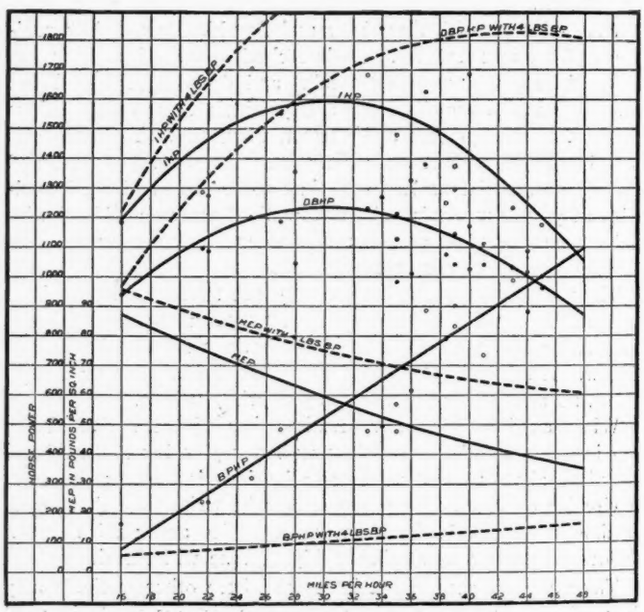


Fig. 3—Chart of Performance of Pacific Type Locomotive.

as has been frequently claimed, but to the amount of back pressure which is required to produce a draft. If the assumptions made were correct, with a back pressure of only 4 lbs. at 28 miles per hour, the indicated horse power would be 2,100, the drawbar horse power 1,500, and the back pressure horse power slightly above 200, which would mean that either greater speed could be obtained or, if this were not required, there would be a greater saving in fuel consumption.

The chart in Fig. 3, has been prepared from data secured in tests of a Pacific type coal-burning balanced compound passenger locomotive with cylinders 17½ in. x 29 in. x 28 in., and shows performance over heavy mountain grades with a train of 11 cars, or 644 tons. The back pressure on this engine was exceptionally high. At speeds ranging from 16 to 45 miles per hour, the back pressure horse power was 175 and 1,000 respectively. At a speed of 20 miles per hour the back pressure horse power was 220, the drawbar horse power 1,080, and the indicated horse power 1,400, or the back pressure horse power was 20.5 per cent. of the drawbar horse power and 15.9 per cent. of the indicated horse power. This locomotive attained maximum indicated horse power at a speed of 34 miles per hour. At this speed the back pressure horse power was 650, the drawbar

horse power 1,200 and the indicated horse power 1,580, so that the back pressure horse power was about 55 per cent. of the drawbar horse power and about 41 per cent. of the indicated horse power.

It will be seen from a study of these charts that the back pressure horse power and drawbar horse power curves cross at a speed of 45 miles per hour and at a horse power of about 1,000. Assuming an average of 4 lbs. back pressure, the back pressure horse power curve has been plotted as a dotted line. The increased mean effective pressure, drawbar horse power and indicated horse power resulting from the reduction in back pressure are also shown by dotted lines. The increase in mean effective pressure, due to decrease in back pressure, is 10 lbs. at 20 miles per hour and 23 lbs. at 45 miles per hour. At the maximum indicated horse power, the possible increase in indicated horse power and drawbar horse power would be about 800.

This locomotive is of very recent build and its design is consistent with most modern practice for mountain passenger service. While it is giving satisfactory service, the great savings to be made in fuel consumption or the possible increase in speed by reduction in back pressure are readily apparent. With so high a back pressure it would be impossible for this engine to be efficient at any high rate of speed; in fact, it would be impossible for the engine to maintain a high rate of speed with any considerable weight of train. At the speed of 45 miles per hour, where it should show its highest efficiency, it must give up an equal amount of power, to produce the required draft, as is delivered at the drawbar.

The calculation of the theoretical horse power required to draw the gases through the flues and front end of a locomotive is comparatively simple. The method employed in arriving at the data herein presented was as follows:

$$\text{H. P.} = \frac{PAV}{33{,}000}.$$

P = Pressure per unit of area against which the gases were pulled.
A = Total area of the tubes.
V = Average velocity of the gases in feet per minute, calculated as follows:

$$V = \frac{CB}{60A} F.$$

C = Cubic feet of air necessary per pound of fuel.
B = Pounds of fuel burned per hour.
A = Area of flues in square feet.
F = Factor for increase in volume of gases due to increase of temperature from 60 deg. F. to 700 deg. F.; assuming conditions from 60 deg. F. to 700 deg. F., this value is 2.2.

In obtaining the values of C, calculation was based upon the analysis of the fuel and flue gases as obtained upon tests of both coal and oil burning locomotives.

The weight of air per pound of fuel burned was calculated as follows:

$$A = 3.032 \frac{N}{CO_2 \text{ plus } CO} C.$$

A = Weight of air supplied per pound of fuel.
N, CO, CO_2 = Percentage by volume of nitrogen, carbon monoxide, and carbon dioxide in the flue gases.
C = Proportional part by weight of carbon in the fuel.

Substituting actual figures in the above formulae, after reducing to unit of volume, gives a value of 185 cu. ft. of air per pound of coal burned.

Calculation by the same method for oil burners gives a value, in round numbers, of 200 cu. ft. of air per pound of fuel burned.

The following specific example will show the method:

ENGINE 923—COAL BURNER.

Run: La Junta to Trinidad.
Average fuel per hour = 4,415 lbs.
Draft in front end = 5.8 in. water.
Draft in front of tube sheet = 4.4 in. water.
Areas of flues = 1,265 sq. in., or 8.78 sq. ft.

$$V = \frac{185 \times 4{,}415}{60 \times 8.78} = 1{,}552 \times 2.2 = 3{,}415 \text{ ft. per minute.}$$

The power required to draw the gases through the flues alone will be

$$\text{H. P.} = \frac{(4.4 \times 0.0361) \times 1{,}265 \times 3{,}415}{33{,}000} = 20.8.$$

The horse power required to draw the gases through the flues under the diaphragm and through the netting equals 27.43.

The actual horse power utilized producing a draft in any given class of locomotive is taken as the horse power due to the back pressure in the cylinders. This back pressure horse power is not entirely chargeable to the production of draft because of the impossibility of operating non-condensing engines without at least 3 or 4 lbs. of back pressure. A greater part of the power thus expended, however, is used in producing draft alone.

The relation of horse power extended for producing draft to the theoretical horse power required to draw gases through the flues and front end is shown in the following example, Table 1:

TABLE 1.—RELATION BETWEEN POWER NECESSARY TO DRAW GASES THROUGH FLUES AND POWER EXPENDED IN LOCOMOTIVES AS DRAFTED.

Engine Number.	Calculated H. P. required to draw exhaust gases through boiler.	Back pressure at		Excess power in jet	
		M. P. H.	H. P.	H. P.	Per cent. of Required.
923 Coal burner	28	10	160	132	471
		15	275	247	882
		20	390	362	1,294
		25	500	572	2,041
917 Oil burner	25	10	150	125	500
		15	300	275	1,100
		20	450	425	1,700
		25	600	575	2,300
1700 Oil burner	65	10	290	225	346
		15	385	320	493
		20	480	415	639
		25	575	510	784
1301 Oil burner	25	20	300	275	1,100
		30	500	475	1,900
		35	600	575	2,300

The above table is calculated from actual data secured in road tests of representative locomotives covering both freight and passenger, simple and compound, and coal and oil-burning engines. The figures given under the heading, "Calculated horse power required to draw the exhaust gases through the boiler," were obtained by the above method. The horse power of the steam jet for the various speeds in miles per hour was obtained from representative engines in actual service. The difference in these two values gives the excess in power directly chargeable to the exhaust jet. In the last column the values for this excess power consumed are given in percentages of actual work done.

It will be seen that the efficiency of the steam jet, as a means of producing draft in a locomotive boiler, is extremely low from a power standpoint. The efficiency, based upon a mechanical standpoint, i. e., the simplicity and reliability of this form of apparatus, is not included in this statement. It will be seen from a study of the above figures that the loss in horse power, due to the throttling of the engine exhaust, is somewhat startling, amounting in many cases to several hundred horse power.

If other means could be provided to draw the necessary volume of gases through the boiler for the same rate of combustion possible with a steam jet, at an expenditure of power somewhere near the calculated power required to draw the gases through the boiler, a tremendous saving in power would be accomplished. The power thus saved could be utilized in useful work, either as increase in speed or as a direct saving in fuel consumption.

The argument is often advanced that it is not economical to run locomotives at high speeds on account of the great back pressure and the loss in efficiency. This is a very pertinent argument in view of the facts. In service it is shown conclusively that the maximum power is obtained at speeds less than those desired for present time schedules. With increase in speed there is a proportional loss in horse power due to back pressure. The result is that at some speed a locomotive will have its highest efficiency and that speed is generally lower than the speed at which the locomotive is required to do maximum duty.

Discussion.—This paper was received with unusual interest

and discussed by a number of motive power men. W. E. Symons presented a long written discussion, and it was generally agreed that the subject was one in which there is an opportunity for large improvement by the introduction of methods which would reduce back pressure and add to the useful capacity of the locomotive. The variable exhaust was mentioned by a number of the speakers, and, while it was admitted that it is a correct and simple solution of the difficulty, yet there are difficulties in the way of maintaining a variable exhaust in proper working condition. The author mentioned in his closure that he had found by experiment that it required only about 50 h. p. to operate an exhaust fan by a steam turbine, which was sufficient to produce the necessary draft for a large locomotive, and that he hoped to make such an application in regular service.

INSPECTION OF FUEL FROM PRODUCER'S STANDPOINT.

A paper on this subject was presented by J. E. Hitt, in which he said: Before we reach the discussion of inspection of fuel, it is assumed that the fuel purchaser of the railway buys the coal best suited for its needs, taking into consideration the three items; quality, cost per ton on the cars, and the haul to the point of consumption. He can figure with mathematical precision the last two items, but cannot figure so easily, and never accurately, the respective merits of various coals from the standpoint of quality.

In buying coal, it has been the observation of the writer that quality is given more or less consideration by fuel agents, usually less, and generally more attention is paid to the cost on the cars. This is done very often for reasons of policy to divide the tonnage between several operators, knowing when the purchase is made, that the quality of coal in one mine is inferior to the product from another one nearby. After this serious mistake has been made, the fuel agent's only recourse is to get for his company, as nearly as possible, a perfect preparation of an inferior grade of coal, or if he has given the question of inherent quality of the coal full consideration, then he must watch closely its preparation, or the advantage he has gained by buying a superior grade of coal will be more than offset by its depreciation, due to careless mining. We are compelled to admit that you will find many careless operators, sometimes through ignorance, sometimes intentionally careless, but, I believe in most cases, through necessity, because of competition with neighboring operators due to the present over-production forcing him to sell his coal for less than the cost of production, if in the cost is included an ideal preparation.

There is no doubt in my mind but that too little attention is given to the inspection of coal by railways, and that a more rigid and careful inspection would meet with the approval of most operators and eventually work to the benefit of the operator. It would tend in time towards a better preparation of the entire production from his mine. I do not know of a commodity entering into the operation of a railway which apparently is given as little thought as to the quality of the product, especially when we consider that it constitutes so large a portion of the purchases of the railway, as fuel. It is hard to take seriously complaints received at long intervals from our railway customers when they generally seem so disinterested as to the impurities in the coal they are buying.

I would suggest that a coal miner be selected from each mine producing railway coal, to act as inspector, one man for each road taking coal from the mine; or preferably, to save expense and avoid confusion and possible opposition from operators to the plan, one man to represent all companies. This man would be qualified and would know whether the company was getting the best prepared coal from the mine and, if it was not, would know how best to remedy the trouble. He would know what miners are loading dirty coal, and by co-operation with the management could overcome the difficulty to a great extent.

INSPECTION OF FUEL FROM CONSUMERS' STANDPOINT.

Glenn Warner, fuel inspector of the Cincinnati, Hamilton & Dayton, read a paper on this subject in which he said: A fuel inspector should be an energetic, frankly diplomatic man of broad-minded, sound judgment and with an analytical mind. The analytical mind is sometimes a natural gift, but more often the result of scholastic training; however, this quality is needed, for the fuel inspector must analyze each problem and from results find causes. Having appointed the fuel inspector, copies of the contracts should be given him that he may study them preparatory to visiting the different mines, for each mine should be visited and an extensive report made on it and its characteristics. Enough time should be spent to make each report complete in itself. The exact location of the mine, altitude, name and characteristics of the seam should be carefully noted so that there may be a tie with the government geological data. The method of mining, preparation of the coal, facts relative to mining equipment and labor conditions, and statistics regarding the mine output and railway facilities at the mine should be carefully noted. Too much stress cannot be laid on making this mine report complete in itself. The reason is very evident to the men among us who have been asked questions concerning the mines. The fuel inspector should become so well acquainted with all the mining conditions that he will be in position to answer all questions that may be asked of him. While at the mine he should take standard characteristic face samples of the seam so that the analysis may accompany the mine reports. The inspector should become acquainted with the active operators and carefully note and discuss with them the coal contracted for as it is being loaded in the cars.

Contracts in general, and railway coal contracts in particular, are rather more favorable to the buyer than to the seller, and such contracts should be interpreted with good judgment by one who is acquainted with all of the mining conditions.

After acquainting himself with the traffic movement between the mines and the final destination, the inspector's place is on his road. It is my opinion that road work, combined with an occasional visit to the mines, will accomplish more than a constant watching of the mines, for I do not believe that the active operators belong to a class of men that must be watched all the time.

Being on the road, it now becomes the inspector's duty to first see that it is getting the best grade of coal that can reasonably be expected from the different mines. To carry on this work I have found it convenient to have a tabulated statement of all cars shipped, showing the name of the shipper, car number and initial, date of shipment, name of mine and grade of coal. This tabulation may be arranged in ten sections, so that the car numbers ending in the same numeral may be grouped. The interval of time elapsing between the mine loading and the arrival of a shipment is ordinarily long enough so that the tabulation may be made up from the mine shipment notices and placed in the hands of the inspector before the shipment arrives. Armed with this specific data and knowing what grade of coal is to be expected, the inspector is qualified to pass final judgment soon after the coal arrives.

At the start the attitude of the fuel inspector should be that poor coal is the result of unpremeditated carelessness on the part of the mine operator. The coal men mean to be fair, but are sometimes careless at the mines, especially with railway fuel. This carelessness sometimes becomes rather chronic and occasional bad doses must be prescribed to bring conditions to a healthy state. This bad dose consists of condemning the coal, demanding and requiring the coal company to reconsign it. The latter part of the procedure should be only recommended by the inspector. The responsibility connected with all coal condemnation should be shouldered by him, and he should be able to justify any action he may recommend. All of the coal inspection should be done on the receiving road,

and the operators are justified in criticising the railway company for condemning poor coal, resulting from carelessness, after it has reached its destination. The road company ought not to be expected to furnish inspectors at the mines to keep the miners from being careless. A penalty system is hardly practicable at this stage, because of the various grades of coal used, the territory covered in the distribution, and the great amount of work involved.

At stated intervals, the inspector should supervise the weighing of all cars, for a short period, with the view of checking up weights and locating any discrepancy that may be present.

Being on the ground and in contact with the actual operating men of the road, the inspector ought to be able to make valuable suggestions for the betterment of the fuel service. To be successful in his work, he must have the hearty co-operation of the motive power department. Since the fuel inspector must be, in a way, responsible for good fuel service on his road, he should either conduct or be present at all fuel tests, and carefully note the behavior of the different fuels.

The fuel inspector should gather enough definite data so that an equation may gradually be formulated between the actual value of the fuel from a standpoint of efficiency, and the commercial value of the contract. When these equations are formulated and taken into consideration in the purchasing of fuel a great deal of money will be saved.

STANDARD COAL ANALYSIS.

J. S. Sheafe (Illinois Central), as chairman of the committee on this subject, read a report in which the methods recommended by the American Chemical Society were stated to be the most suitable. If the association does not wish to adopt any standard at this time, the committee urged that the method actually used in any case be specified as the results would vary considerably. Some form of Baumé calorimeter was recommended. The committee was continued and asked to keep in touch with the other societies interested, and make an effort to secure a general standard analysis.

OTHER BUSINESS.

W. F. M. Goss, dean and director of the College of Engineering, University of Illinois, was unanimously elected an honorary member of the association.

The following officers were elected for the ensuing year: President, H. T. Bentley, assistant superintendent of motive power, Chicago & North Western; first vice-president, R. Collett, superintendent of locomotive fuel service, St. Louis & San Francisco; second vice-president, D. B. Sebastian, fuel agent, Chicago, Rock Island & Pacific. Executive committee, two years, D. C. Buell, J. G. Crawford, R. Hibbet; one year, R. Emerson, W. H. Averell and W. C. Cox.

Chicago was practically the unanimous choice as the location of the next convention.

RESULTS OF OPERATION OF THE FRENCH STATE RAILWAYS 1909 TO 1911*

BY C. COLSON.

The influence of the buying up of the Western railway system by the French government on the French budget makes itself felt nearly uniquely through the results of operation. We know that the conditions of the purchase were such that the shareholders received exactly the same revenue as before. The state, which receives the net profits yielded by the railway formerly owned by the stockholders pays them that revenue as an annuity, while it formerly made up that amount as guaranteed interest. The deficit it has to meet hence only varies to the extent that the net profits, which go to reducing the capital charges, vary by the effect of the change of administration. The addition to capital of the deficit of the year before the purchase certainly was one of those disguised loans which lighten one budget at the expense of future budgets. The development given, with good reason, to supplementary constructional works will in the future increase the capital charges very largely. But these are facts which only exercise a secondary influence on the magnitude of the deficits which have to be met, and it is in the traffic accounts that we find today the essential element for appreciating the financial results of the state working. As yet one hardly hears any remark that the service now supplied to the public is better than that of the company, which was so severely criticized. What difference is there as regards net cost? That is what the examination of the accounts for 1910 and of the credits asked for 1911 and 1912 will show us. We also have to consider to what extent the differences result from causes which would have equally affected both the company and the state, and that is a question difficult to solve.

In the accompanying table No. 1 we give comparative figures for the last three financial years of the administration of the old state railway system, and also for those of the Western Railway, now bought up. In the latter case, the figures for 1908 are given arranged in the form adopted by the administration in the 1909 accounts, so as to make it possible to compare the last year's operation by the company with the first year's operation by the state. The 1909 and 1910 figures, moreover, include the expenses called *normal* by that administration, those it calls *arrears left by the Western company,* and which amount to about 7,700,000 francs ($1,590,000) for each of those two financial years. These expenses, by their nature, are in fact included among those which every railway administration which keeps its accounts properly includes among normal expenses, and there is no reason for thinking that *from the point of view of maintenance and of working expenses,* the business taken over by the state is burdened by any exceptional charges.

That is a point which it is necessary to mention and to lay stress on, for it is one of those which have given rise to very

*Abstract of an article in the Bulletin of the International Railway Association.

TABLE 1.

	Old Railway System.			Nationalized Western Railway.		
	1908.	1909.	1910.	1908.	1909.	1910.
Average mileage operated	1,844	1,844	1,844	3,683	3,683	6,702
Operating revenue—						
Passengers	$3,960,000	$3,980,000	$4,020,000	$18,240,000	$18,440,000	$18,840,000
Additional quick freight	1,620,000	1,760,000	1,840,000	5,120,000	5,240,000	5,440,000
Slow freight	6,100,000	6,440,000	6,640,000	18,700,000	18,660,000	20,220,000
Other receipts	120,000	100,000	140,000	1,460,000	1,520,000	1,420,000
Total	$11,800,000	$12,280,000	$12,640,000	$43,520,000	$43,860,000	$45,920,000
Expenses—						
Management and administration	$100,000	$60,000	$80,000	$220,000	$220,000	$260,000
Working	2,820,000	2,760,000	3,080,000	11,500,000	11,260,000	15,860,000
Locomotive and rolling stock	3,460,000	3,480,000	3,800,000	11,040,000	11,180,000	14,560,000
Way and works	2,200,000	2,360,000	2,540,000	4,060,000	5,280,000	6,740,000
Miscellaneous	940,000	980,000	1,020,000	2,880,000	3,460,000	3,760,000
Expenses	$9,520,000	$9,640,000	$10,500,000	$19,600,000	$31,040,000	$36,180,000
Net profit	2,280,000	2,640,000	2,140,000	13,910,000	12,460,000	9,740,000
Receipts per mile	6,405	6,665	6,855	11,810	11,910	12,390
Ratio of expenses to revenue	80.7%	78.4%	83%	68%	71.7%	78.8%
Train mileage	11,600,000	11,700,000	11,900,000	35,500,000	36,200,000	36,800,000
Average rate per passenger per mile	.94%	.94%	.930%	1.008%	.998%	.992%
Rate per ton per mile on slow freight	1.482	1.478	1.478	1.504	1.492	1.500

vexatious misunderstandings. All the information which it is possible to collect, from the engineers of the state administration, from those of the old company and from those of the head authorities, shows very clearly that the Western Company, till the very last days of its existence, kept its system in a good state of maintenance.

In saying this, we do not wish to assert that the state of the old Western Railway was satisfactory. But what really showed deplorable arrears was the rolling stock, and also the supplementary works necessary in consequence of the growth of the traffic. Those are expenses which do not appear in the working accounts and the postponement of which could neither increase the net profits during the last years of the company, nor reduce them during the first few years of the state management, except perhaps indirectly, owing to the reflex influence of the insufficiency of the installations on the progress of the service. It is hence necessary to include the so-called arrears among the normal expenses of 1909 and 1910, if a proper comparison is to be made between the results of the last few financial years, and this we have accordingly done in the accompanying table.

This table shows how quickly the real net profits of the bought-up system are decreasing. However, we could not consider as exceptionally high the net profits of 70 millions ($14,000,000) obtained by the company in 1908, its last year of working, when the corresponding figures were 80 millions ($18,000,000) in 1907 and 89 millions ($19,800,000) in 1906; while the average for the ten years before the nationalization was about 78 millions ($15,600,000). In order to make the variations shown in the table intelligible, they should be compared with those of the preceding years, and also with those obtained during the same years on the system of the five large companies which have not been nationalized. It is of course clear that these comparisons can only apply to the absolute magnitude of the variations in receipts or working expenses of a very unequal character, and it is the importance of those variations, as compared with the figures to which they apply, namely the percentage, which is to be compared. Table No. 2 contains a summary of this for the last four years. Increases are marked with the plus sign, decreases with the minus sign.

The final figures for 1911 may differ materially from those which the present position of the receipts and the credits asked for allow us to forecast. We think, however, that we may be certain that we do not stray far from truth when we say that the reduction in the net profits, after three years of state working, will be between 40 and 50 million francs (between $8,000,000 and $10,000,000) (say half more), for a year (1911) to which no external circumstance gives any exceptional character, from the point of view of receipts or of expenses. Before the nationalization we said (and the event has confirmed it) that the operation would have no result, from the point of view of the relations between the state and the company, that consequently its financial results would depend exclusively on the difference between the company's management and the state's management. It was difficult to doubt, after all the experience gained in France and abroad, that state operation would be, for one and the same kind of service, more expensive than operation by a concessionary. Would it be right to say that the new experiment had confirmed this opinion, to that very large extent that the figures given above show?

In the first place, it is only right to state that in the increase in the expenses during the last three years there are certain elements which have a temporary character; the difficulties and even the disorganization of the service, which will soon become reduced, and it is to be hoped will in the end disappear, entailed extra expenses and the payment of claims of much greater amount than normally; the compensations for loss, damage and delay, which were already excessive in the preceding years, again doubled in 1911. On the other hand, without accepting the fable of badly-maintained tracks, it must be recognized that the system of general repair adopted by the Western company, having come to an end in 1901, had sooner or later to result in a recurrence of the expenditure previously described as exceptional by the company. Finally, the extension of the supplementary works charged to capital account is also not without influence on the operating account, as there is the very wise rule on all railways that that account is immediately debited with the cost of the installation done away with. The actual increases in the expenditure hence include several million francs which will gradually disappear in the future.

There are also some increases in expenses, due to causes which burden all railway administrations. Everywhere the general rise in prices and in wages, increasing the expenditure on materials and on the staff, increases the net cost of transportation, and we know that in many countries state administrations and companies are compelled to try to counteract the increase in their expenses by raising their rates. In France the need of raising certain wages, especially in the lowest grades, makes itself felt on all the railways. In addition to these sacrifices which are indispensable in order to keep the remuneration of the employees at a proper level corresponding to the state of prices generally, recent legislation has added others in order to give retired employees pensions quite out of proportion to those which the state grants its own employees. The expenditure imposed by the pension law would evidently have increased the operating expenses to the same extent if the railway had not been nationalized.

On the other railways, the extra charges incurred in 1909 and 1910 were appreciable, and the companies on the whole, although they had rather less earnings to meet them than the state, succeeded in slightly increasing their net profits. It hardly seems doubtful to us that, in 1911, the first year that the pension law came into force, the profits will finally show a slight decrease on the whole of the railways operated by companies. Nothing, however, as yet makes it probable that there will be a collapse anything like that shown by the figures given for the state system.

A summary of the share of the employees in this increased expenditure is given in Table 3, taken from the preamble of the supplementary budget for the state railways for 1912. The figures refer to this future budget, and as a considerable part of the increases only came into force on October 1, 1911, they no doubt exceed appreciably those for that year.

Thus the expenditure incurred for improving the lot of the employees in 1908 amounted on both systems together to 32 million francs ($6,400,000), in which payments towards pensions only figured for 4 million francs ($800,000). On the Western system, the increases in pay, premiums and sundry allowances amounted to 32 per cent. of the sums previously granted, and on the old railway, the generosity of which towards its employees was, however, always extolled, it amounted to just over 20 per cent.

Now if by means of these sacrifices which have to be paid by the tax payers of the whole of France, the administration of the state railway had secured the devoted services and the gratitude of its employees, one might perhaps maintain that it had not paid too much for such a manifest advantage to itself and to its customers. But if there is one point about which there is a general agreement among all those who are in direct contact with the employees of the nationalized railway, it is that these employees have never been less zealous and more fertile in complaints and recriminations. Some trace the origin of this state of affairs to the bad habits formerly tolerated by the company; others attribute this corruption of employees formerly satisfactory to the agitation for and against nationalization and to the sudden introduction of state regulations on a railway system to which they were not suited.

The administration of the state railway, like any other employer, would no doubt have received gratitude from its employees if it had gradually granted, without showing any ill will about it, the increases necessary in order to bring the pay to a level corresponding to the general state of the labor market, and compatible with the financial requirements. By suddenly granting, at the eve of the strike or the day after it, increases absorb-

ing nearly half of its net profits, it gave its employees the impression that the sole reason for its concessions was fear and undue parliamentary influence. One saw the astonishing spectacle of the nominal defender of the budget compelling a weak public administration to incur expenditure which it did not deem necessary. The thoughtlessness with which decisions were arrived at has since been made evident by the impossibility of establishing proper budget provision to allow for them. Nevertheless the employees have been showing, since then, more discontent than satisfaction. In fact, as soon as it is admitted that it is good will towards the workers, and not the value of their work, which is to regulate their pay, there is really no reason why they should be contented with 5 francs ($1) per day, rather than 6 francs ($1.20), with 7 francs $1.40), etc.

The impression of weakness, of contempt for the financial results, spread among the employees by the prodigality which the figures given above make clear, is certainly one of the causes which have led to the general relaxation of discipline to which is due the bad service recognized by many of the partisans of the nationalization. The defenders of the state administration now lay stress on the special difficulties connected with the operation of the state system, whose traffic consists chiefly of troublesome items, such as seasonal traffic to the seaside, suburban services requiring many sidings at stations for very small returns, harvests exceptionally variable. In addition to all these causes of irregularity, there is a navigable waterway, paralleling the main line, which on some days dumps on to the railway, in case of ice, or low water or flood, a mass of traffic. We wish to confirm here that the administration of the state railway has in fact to contend with difficulties which seldom are found united; and we only regret that its partisans have so often treated these same considerations as vain pretexts invented to excuse the incapacity of the company when the opponents of nationalization brought them forward formerly.

To meet all these difficulties, the administration of the state railway took over a railway system which, it must also be admitted, was not equal to requirements, and it is from this point of view alone that the arrears that we mentioned at the beginning of this article, exist. This was not a state of affairs peculiar to this railway system. Simultaneously on the railways of nearly all the chief industrial countries, the great rush of traffic in 1907 had not only caused the reappearance of the difficulties bound to arise during all exceptionally busy periods, but had passed the limit where small improvements would help. Hence, nearly everywhere it became necessary to increase the traffic-capacity of the railway by duplicating many lines, by building several new lines, by building yards; in fact, by undertaking a large quantity of work taking a long time.

To return to the nationalized railway, the bad financial state of the company, the indecision of the governments who were sufficiently wise to oppose nationalization and too weak to bring to a head the agreements always being prepared in order to avoid it, had resulted in producing a state of uncertainty which has led to the postponement of most of the improvement projects prepared by the engineers, in order to meet conditions which would necessarily arise if traffic grew. It was only during the last few months of its existence that the company, no longer daring to accept responsibility for the suburban service, with means which had become utterly inadequate, decided to bring forward the scheme for electrifying the lines ending at Saint-Lazare station and for re-constructing that station, and to disregard the reproach of presumption which it incurred by speaking of building and of improvement just before its death.

The administration of the state railway has again taken up this scheme, and widened its scope, so that it will involve an expenditure of about 140 million francs ($28,000,000). There is some talk of a nearly equal expenditure on yards and on the reconstruction of the chief stations of the railway, and of an expenditure of about 40 millions ($8,000,000) on sundry junction lines. What with the duplications and the strengthening of the tracks, the construction of new lines, especially to give another route between Havre and Paris, the reconstruction of Montparnasse station and the electrification of the lines ending there, the figure of 500 million francs ($100,000,000) of capital, to be spent within a comparatively short period, will be much exceeded. The expenditure of this kind, in addition to the interest on the stock to be issued which will also form a large item in the budgets of the state railway system, will, if the net profits do not grow rapidly, show a very serious deficit. In this respect, as in that of the employees, it is of importance that the administration of the state railway should do what is necessary as quickly as possible, but it must not think that the best way of answering the attacks aimed at it is the indiscriminate expenditure of money. Too sudden advances are often followed by sudden stops.

As regards more especially the increase of rolling stock, it is not long ago that the representatives of the state system, in a commission over which we had the honor to preside, recognized the very serious inconvenience to national industry as well as to railways, of irregularity in ordering from companies. Is there not some forgetfulness of what they then said, in the present enormous orders for rolling stock and for materials for permanent work which is rather far off, just at the time when it is necessary to increase operating expenses in order to counteract the lack of facilities?

We have just examined the financial position of the two nationalized systems. But in the operation of railways, the financial result is not the most important one; one may almost say that it is a secondary one, of such vital interest is the proper service to all the places concerned. From this point of view, what are the causes of the disorganization existing on the state system? It is impossible for us to avoid expressing our opinion on this subject, for it is at present the most serious question in connection with the traffic.

We already referred to one of the more important causes of the existing difficulties, when we mentioned the arrears left by the company, not as regards the maintenance of its tracks and its safety appliances, for from this point of view the most careful supervision had not found anything to reproach the company with, but from the point of view of the indispensable extensions

TABLE NO. 2.—INCREASE OR DECREASE IN GROSS AMOUNT OF REVENUES AND EXPENSES OF THE GREAT WESTERN AND OF THE PRIVATE COMPANIES.

	Revenues.	Expenses.	Net Earnings.
1906-7—			
Western	+$240,000	+$2,020,000	—$2,140,000
Other companies	+ 700,000	+ 2,020,000	— 640,000
1907-8—			
Western	+ 620,000	+ 2,600,000	— 2,840,000
Other companies	+ 320,000	+ 780,000	— 200,000
1908-9—			
Western Nationalized	+ 160,000	+ 1,220,000	— 2,100,000
Other companies	+ 520,000	+ 700,000	+ 340,000
1909-10—			
Western Nationalized	+ 940,000	+ 3,040,000	— 4,360,000
Other companies	+ 540,000	+ 680,000	+ 360,000

TABLE NO. 3.—FORECAST OF THE RESULTS OF OPERATION OF THE OLD STATE RAILWAY SYSTEM AND OF THE NEW NATIONALIZED WESTERN SYSTEM IN 1911.

	Revenues.	Expenses.	Net Revenue.
Old state system—			
Original budget	$13,040,000	$10,680,000	$2,360,000
Increases	160,000	920,000	.....
Total	$13,200,000	$11,600,000	$1,600,000
Western Nationalized—			
Original budget	$46,600,000	$34,260,000	$12,540,000
Increases	600,000	6,460,000	.....
Total	$47,200,000	$40,720,000	$6,480,000

TABLE NO. 4.—INCREASES IN EXPENSES FROM 1908 TO 1912 DUE TO INCREASED COST OF LABOR.

	Old State System.	Western Nationalized.
Expenses in 1908—		
Salaries	$4,482,000	$14,444,000
Contributions toward pensions	385,000	1,371,000
Increases due to advanced wages paid those in service at time of nationalization of the Western—		
Salaries	930,000	4,627,000
Pensions	195,000	636,000
Normal increase deductions made for dismissal, retirement, etc.	280,000	1,120,000
Increase due to increase in number of staff	430,000	2,340,000
Total expenses provided for in 1912	6,503,000	24,539,000
Total increase in four years	1,836,000	8,724,000

in the installations, the equipment and the staff, so as to be able to meet future needs. As regards this point, the responsibility is equally divided between the company, who managed the affairs of the railway until 1908, and its adversaries who, by urging incessantly that the company should end, made it really very difficut for it to work with an eye to the future. Above all it was the delay in the vote of the senate which was vexatious. The senatorial commission, which had decided at first to reject the nationalization measure and which would no doubt have obtained the requisite majority at that moment, did not wish to risk the downfall of a minister who raised the question of confidence, and the resulting compromises certainly seriously aggravated the difficulties of the situation.

The day after the vote of the senate we even expressed the opinion that once the public authorities had decided to take the Western Railway out of the hands of the men who managed it, there was nobody able to replace them outside the administration of the state system. Even the men who regretted to see that administration obtain that reward for the part it had taken in the campaign involving such serious risks, saw no other solution, and we continue to think that it would have been difficult to find one which was less bad.

The new management thought in good faith that all that would be necessary would be to introduce its staff and its methods everywhere, and then all difficulties would cease. Instead of carefully studying the organization it took over, before attempting to modify it, instead of listening to the advice of the men who had taken part in developing it, it wanted to change everything at once. It divided all its services in half, without making any room among the new heads for any officers of the old company, who were disregarded and hardly even consulted. It considerably reduced the very necessary authority of the head of each department over his subordinates, by appointing a special staff management which selects the men for difficult work, and gives rewards and punishments. It has introduced a whole organization of promotion and discipline committees which could give good results on a little railway system easy to operate, but which would require serious modification before it could be applied to a much more complicated railway system and to employees upset by a long period of uncertainty with respect to their future. Finally, by a singular contradiction, at the same time when it was making complaints about the tool handed over to it, it imagined that it could do far more with this tool than the men expected who had previously been accustomed to handle it. Trains were multiplied, and the speed of the express trains was materially increased before any time had been spent to ascertain whether the rolling stock, the staff and the permanent way were able to cope with a denser and faster traffic.

For the first few weeks after the state took over the railways it seemed that considerable progress was being made, all employees showing exceptional zeal, as is always the case at the beginning of a new regime. But the honeymoon does not last for ever, and very soon the mistakes we have just mentioned, added to the difficulties of the situation, resulted in a disorder which led to a number of complaints far exceeding those made against the company. Accidents increased in number and several produced real catastrophes. As regards railway men, it is by the frequency of accidents and of irregularities that the operation is judged; but what moves public opinion is the number of the victims, and this is often only the result of a deplorable combination of circumstances. The minister of public works thought it necessary to dismiss the chief officers. In replacing them, he had the happy thought of re-establishing the organization adopted on all large railway systems, namely establishing three great divisions dealing respectively with traffic, permanent way and transportation. Each of these departments has a technical head who has authority to take or to propose all measures relating to the employees, and who consequently can be held responsible both for the faults of his subordinates and for his own.

The new management had the courage to reduce the number and the speed of the trains at once and to strengthen discipline; for some time there was then at least some regularity in the service. But this new honeymoon also came to an end; again complaints multiplied, again there is a disorder which makes itself felt everywhere and which it would be cruel to draw attention to, and again one hears of changes as regards the officials who manage the system.

Whatever steps may be taken, it will not be possible to put an end to the existing difficulties in a day or two. Time is required for making the necessary improvements on trains, tracks and at stations where the work must be carried out without interrupting the service. Time is also required to re-establish cohesion and discipline in a body of employees who are very much upset, at a period when any strong measures in the case of the lower grades are hardly possible. Yet more time is required in order to find, train and advance gradually to the front rank those very rare men who are capable of satisfactorily filling the higher offices of a great service. One has seen, one will perhaps again see private companies whose management was satisfactory neither to the public nor to the shareholders, where the higher officers who were growing old had been unable and unwilling to train up successors to themselves in sufficient numbers to meet all requirements. It has taken boards of management years to repair the mistakes made; they have had to follow, with perseverance, a wise course of conduct, training gradually new department heads. But in such cases one at least had, in order to get over the times of difficulty, traditions guiding the whole of the employees, and it was possible to appeal, in case of necessity, to men coming from outside, to whom were guaranteed positions equivalent to those they left. On the railway system bought by the state, all traditions were upset, and nobody could guarantee to the most eminent chief the time necessary for properly carrying out a long work of reorganization. It would consequently be very difficult to find men skilled in the higher branches of railway work, who would be willing to leave a situation gained by a long period of work, in order to undertake a very difficult and uncertain piece of work, particularly when they would by no means feel certain of being supported with sufficient attention and energy.

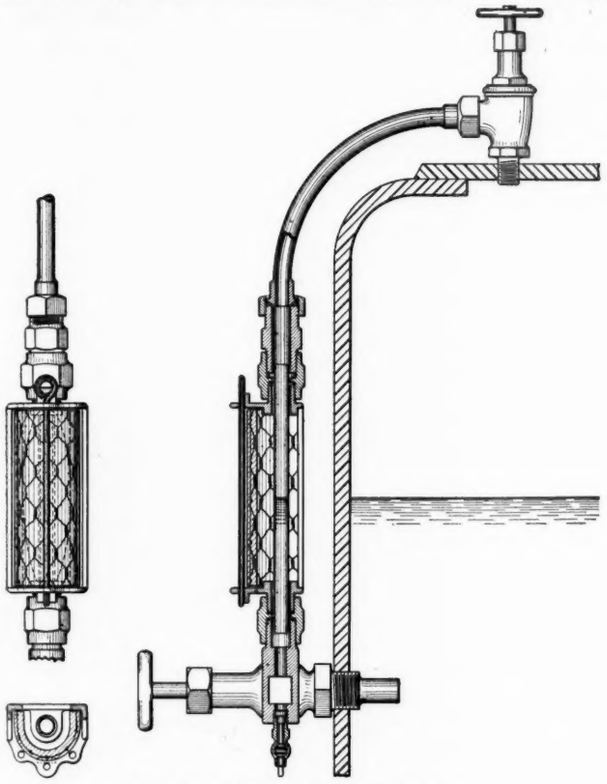
It is true that the finance act of 1911, in reorganizing the state railway system, has given them a railway council which cannot direct them (is not the work of the council), but can control the management, support it when encountering difficulties, correct if necessary any mistakes, and bring that foresight to bear without which all future progress is impossible. But this council is purely a consulting body and has very little authority, and considerable room is given in its composition to elements which will not contribute much towards its strength. The financial organization given to the railway system is satisfactory. It establishes the necessary distinction between capital account and operating expense; it provides means for regulating each year the amount added to the capital, in accordance with its needs. Although it allows certain arrears to be charged to loans, it has at least limited the total amount of this to 75 million francs ($15,000,000). It provides that the capital charges should appear in the accounts, divided as between the part which will be definitely charged to the general budget of the state and that which it is advisable to charge to the special budget of the railway system, provision being of course made for the state to provide for deficits.

Experience will no doubt show that it will be necessary to correct this legislation in certain particulars, especially by giving the council more authority so as to ensure a certain stability in the management of the railway system; but in its essential features it forms a considerable improvement as compared with the preceding regime. Unfortunately laws and regulations are not able to remedy in a day a disorganization due partly to old mistakes, partly to recent errors, finally partly to the difficulties inherent in state operation. We can but repeat the wish we expressed the day after the nationalization, namely, to see at last the success of the administration of the nationalized railway system.

IRONCLAD WATER GLASS PROTECTOR.

The federal rules and instructions relating to the inspection and testing of locomotive boilers require "that every boiler shall be equipped with at least one water glass and three gage cocks. Locomotives not now equipped with water glasses shall have them applied on or before July 1, 1912. All tubular water glasses and lubricator glasses must be equipped with a safe and suitable shield which will prevent the glass from flying in case of breakage, and such shield shall be properly maintained."

These requirements will make it necessary to equip a large number of locomotives with water glasses, as some of the larger



Ironclad Water Glass Protector.

railways have not used them. The other requirement, that the water glasses must be protected, will make a large demand for a safe and suitable shield to prevent glass from flying in case of breakage, as many lines which use water glasses have not used any protector.

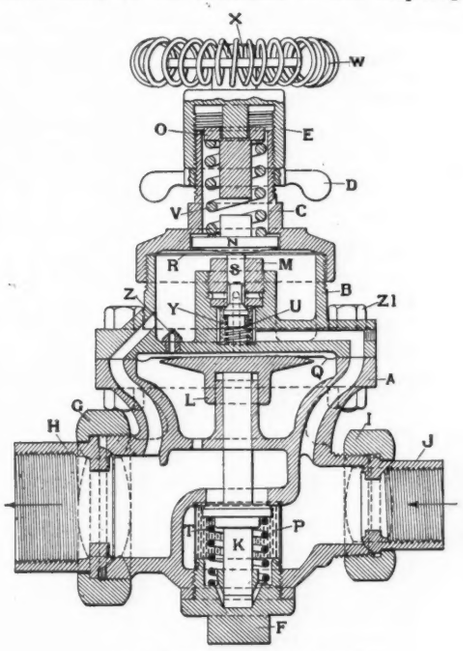
The Sargent Company, Fisher building, Chicago, which has been making safety appliances for various locomotive cab fixtures, recently developed an improved water glass protector, which is named the "Ironclad." It consists of a curved section of wired plate glass entirely surrounding the water glass. This wired glass is imported from Germany and is specially made for the purpose. It is held in position by a malleable iron frame with top and bottom flanges having holes for the outside rod.

These protectors are made to fit any style of water glass cocks now in service, so that it is unnecessary to purchase new equipment in order to comply with the federal rules. With the glass protector the water level is plainly visible from any position in the cab, and the life of the glass water tube is considerably lengthened, as it is protected from drafts of cold air and splashes of water. The wire glass protector has been in successful use over three years on many railways, but recently the "Ironclad" fixture has been designed to combine in one cast member a simple form of holder for the wired glass and a rigid alinement for the water glass stuffing boxes. This device not only protects the enginemen from flying glass when the water glass breaks, but it acts as a shield when shutting the valves. It is not necessary to remove the protector from its frame when the gage glass is removed.

STEAM PRESSURE REGULATOR.

A steam pressure regulator, or reducing valve, which regulates uniformly and practically automatically, has recently been developed by the Gold Car Heating & Lighting Company, New York. It consists essentially of two separate valves having ordinary valve seats, thus doing away with many of the defects found in other pressure regulators with sliding and double seated valves. It has shown up well under a series of severe tests that were made by Arthur M. Waitt, and which consisted of cutting in the cars of a train one after another as the car before showed steam at the drip. In some cases three coaches were thrown in at one time, and with the valve regulated at 30 lbs. no appreciable change could be noticed on the gage.

Another test consisted of allowing the rear valve to be open for fully two minutes, and then all the cars were cut off suddenly by closing the connection between the tender and the first car. Also, the hose connection behind the tender was broken and the steam allowed to flow to the atmosphere at full supply pressure. In both of these cases the gage on the reduced side of the valve did not vary. Another test with the regulator set at 40 lbs. was made by opening the steam line at the end of the train; this did not affect the pressure as indicated by the gage. During these tests the boiler pressure of the locomotive ranged between 200 and 205 lbs. The regulator is shown below. It takes steam on the right hand side; it passes upward through a passage to the controlling valve and fills an annular opening surrounding this valve. The pressure is regulated by the handle *W*, which when turned compresses the spring *V*. This spring bears on the seat *N*, which rests on the diaphragm *R*. The stem *S* of the controlling valve bears on the underside of this diaphragm and is



Gold Pressure Regulator.

controlled by it. When the train line pressure is below the predetermined value the controlling valve will be forced down, allowing steam to pass up by it and down through the passage shown by dotted lines, to the top of the diaphragm *Q*. This pressure will force the main valve *K* open, allowing the steam to pass through the valve. When the predetermined pressure is reached, which acts under the diaphragm *R*, the top diaphragm plate *N* will be raised, compressing the spring *V* and relieving the pressure from the controlling valve, allowing it to be closed by the spring *U*. The reduced pressure also acts under the diaphragm *Q*, and when the controlling valve has been closed it will allow the main valve to be closed by its spring *T*. A small leakage plug *Z* takes care of any leakage by the controlling valve. The valve seats are protected by the strainers *Y* and *P*.

General News Section.

The Wabash and the Mobile & Ohio were fined $100 each in the district court at St. Louis on May 25 for violation of the federal laws regulating the transportation of cattle.

The Brotherhood of Locomotive Engineers in session at Harrisburg, Pa., has elected three assistant grand engineers: L. L. Griffing, Long Island, N. Y.; F. A. Burgess, Louisville; Ash Kennedy, Winnipeg.

Mechanical department employees of the railways west of Chicago are taking a vote on the question of striking on June 1 in sympathy with the shop men who struck last fall on the Illinois Central and the Harriman lines.

Cable despatches from Paris, May 19, report a collision on the Northern of France a short distance out of the city in which 13 persons were killed and 45 injured. Two passenger trains came together by reason of a defective switch.

Carl R. Gray, who has resigned as president of the Spokane, Portland & Seattle to become president of the Great Northern, and his successor, J. H. Young, who has been vice-president of the Copper River & Northwestern, were the guests of honor at a dinner tendered by the Commercial Club of Portland, Ore., on May 20.

The railway commissioners of Canada have notified the Canadian Northern and the Midland & Great Northern that they must not lease trackage rights to railways of this country to run their trains in Canada except on condition that the men in charge of such trains shall be Canadians. A fine of $100 a day would be the penalty for running trains with American crews.

Winfield A. Huppuch, vice-president and general manager of the Standard Wall Paper Company, announces his intention of resigning his place as a member of the New York State Public Service Commission, Second district. He has been vindicated by a jury in the Federal Court on charges of violating the anti-trust law and so says that no reason longer remains for delaying the resignation.

The Mississippi State Railway Commission has ordered an inquiry into reports that the Yazoo & Mississippi Valley has been sold to the Illinois Central, and that the New Orleans, Mobile & Chicago has been sold to the St. Louis & San Francisco. Such a merging of competing roads would be contrary to the law of the state, and if the reports are true the commission intends to prosecute offenders.

The Chicago Great Western has announced a "get-together" meeting to be held under the auspices of the roundhousemen, shopmen, track and bridgemen at Oelween, Ia., on June 8. Employees of other departments are invited and any officers who may be present will be expected to take back seats and consider themselves, for the evening, as employees, and not as officials. Mrs. H. J. Slifer, wife of the general manager, will give a lecture on "A Trip Across the Isthmus of Panama," illustrated by about 200 stereopticon pictures.

The proposal of the Secretary of the Interior to utilize equipment now in use on the Isthmus of Panama in building a railway in Alaska has taken the shape of a bill prepared by Secretary Fisher and introduced in the House of Representatives last week by Congressman Sulzer of New York. The bill provides for a commission of seven members to be appointed by the President, and carries an appropriation of $100,000 for its expenses; and the line of the proposed railway as well as regulations for mining coal on the government lands are set forth in considerable detail.

The United States Steel Corporation, with the purpose of promoting every kind of safety device for the benefit of its workmen, now gives out (to visitors of sufficient importance) cigars, bearing bands reading "Boost For Safety." When the smoker reaches for a match and strikes it he is confronted with a line reading "Safety, Quality, Cost, Tonnage," Gold buttons are given to employees who show originality in suggesting new devices for protecting the workmen, these buttons also reading "Boost for Safety." The number of serious and fatal accidents occurring in the plants of the Steel Corporation has decreased every year since 1906.

The suit of the government against the Southern Pacific to recover California oil lands, which was announced in Los Angeles last week, was begun back in 1910. Attorney General Wickersham says that the suit has brought out "sensational and startling disclosures of a remarkable picture of criminal conspiracy among high officials of the Southern Pacific Company to acquire from the United States under an agricultural grant oil lands valued at $15,000,000." The suit is to set aside patents and revest in the government title to 6,000 acres of land in Kern county. The lands are within the indemnity limits of the grant of July 27, 1866, to the Southern Pacific Railroad Company, in aid of the construction of the road.

The New York State Workmen's Compensation Committee (labor leaders) has issued a statement urging the passage by the National House of Representatives of the Workmen's Compensation bill, now pending before the Judiciary Commitee. The bill known as S. 5,382, has been passed by the Senate by a decisive majority, but there is danger of delay in the House, which may carry it over for consideration until the next session. Such delay might seriously jeopardize its passage for the reason that conditions may be changed after the national election. While the bill applies only to railway employees, the committee sets forth that it is to the advantage of every working man in the country to have it enacted into law because such Federal legislation would influence the states to pass laws for the benefit of other industries over which the United States Congress has not jurisdiction.

President E. P. Ripley, of the Atchison, Topeka & Santa Fe, interviewed in Chicago last week, on his return from Pasadena, Cal., spoke optimistically of the crop prospects in the West and Southwest. He also said that the Panama canal would operate to the disadvantage of the Middle West by decreasing the rates from the Atlantic coast and giving that section an advantage over the Middle West. "I see no reason," he said, "why canal tolls should be free for coastwise steamships or any others. It will cost $4,000,000 to $6,000,000 to operate the canal and if tolls are not charged the cost will fall on the country at large in the form of taxes." Asked what he thought of the recent suggestion of President Winchell of the Frisco lines that the government should purchase a large interest in railway securities, he replied: "Why not let the government take over the railways entirely? It might be a good thing for the stockholders; but not for the Republic."

The Pennsylvania Railroad reports that 2,040 of its active employees have been in the service of the road for 40 years or more; and 1,572 who had served that length of time, or longer, are now receiving pensions. Of the men now on the pay rolls, including both active employees and pensioners, 489 began their service more than 50 years ago; and one of these, Charles A. Jefferies, of Lancaster, has been on the rolls since July, 1846. He began on the Columbia & Philadelphia as a fireman; was made engineman in 1849 and in 1883 became a signal repairman. Andrew Abels, a retired clerk, now living in Philadelphia, is 95 years old, and there are seven other pensioners who are over 90. Of the 178 officers of the Pennsylvania, whose biographies are officially recorded, 171 have been with the company throughout their business life; and 84 out of the 178 received a college education. The seven officers who were not brought up on the road are men who were employed because of special training of a kind which could not have been acquired in the service of the road.

Conductors, brakemen and firemen of the Pennsylvania Railroad running on the electric trains between Newark and New York have complained to the general manager because some of these trains are manned by employees of the Hudson & Manhattan; but the general manager replies in substance that the company cannot and will not relinquish its right to enter into a joint arrangement with the other road. These trains run over the Pennsylvania for about six miles, but for a short distance at the New York terminus (Cortlandt Street) as well as for a short

distance at the Newark terminus (Park Place) the tracks of the H. & M. are used. General Manager Long, in a letter to the committee representing the employees, reminds them that for the company to bind itself not to run trains jointly with the other road, would probably result to the dissatisfaction and disadvantage of the men. It would tend to encourage the other road to build a competing line. The present arrangement, which avoids destructive competition, tends to assure improved service and thus is for the benefit of the public. No employee of the Pennsylvania was dismissed because of the inauguration of the joint service. Mr. Long also reminds the committee that the Pennsylvania has always taken special care to safeguard its employees and that in the event of the further introduction of electric power, the employees affected would be carefully looked after.

"Office Cars" on the Illinois Central.

The Illinois Central has changed the inscription "private," which has heretofore appeared on the doors of cars used by officers in traveling over the road, to "office car." In announcing the change President Markham said that the word "private" was a misnomer so far as it indicated the purpose for which the cars are employed. He said:

"The cars on the Illinois Central used by the officers are not in the slightest sense the sanctuary which the word 'private' implies. They are 'office cars' pure and simple, and used for the same purpose as the offices in the general headquarters at Chicago—to transact business with the public and our employees. The cars in question are in reality offices set on wheels, where the business of the company in its internal relations, as well as with the public, is conducted in practically as great volume and with as much regularity as in the home offices of the respective officials who are assigned the cars. On this account, the words 'office car' will convey the true purpose for which the cars are constructed, and not set up the idea in the mind of anyone the impression that the cars are used exclusively for the private advantage of the individuals occupying them. We thus hope to banish any feeling of timidity which may exist in the mind of an individual having business with our officers on entering these cars."

The Linguists of the Passenger Department.

We anxiously await the first crop of railway summer-books in order that we may get an idea of how the Mother Tongue has expanded in the past year. It will also be heartening to hear of the number of Jersey lake resorts that have lined up with that portion of the map in which "mosquitoes and malaria are absolutely unknown."—*Railroad Men.*

A Kansas Opinion.

Travel is a great educator, including in its curriculum the knowledge that a dining car is no place to look for bargains.—*Atchison Globe.*

"Children" of 16, Half Fare.

Mr. Steiger, speaking at the celebration of the 17th anniversary of one of his dry goods stores, declared that his success in the dry goods business is in no small measure due to the training received from D. L. Gillett, of Westfield, with whom Mr. Steiger was first employed. At 16 Mr. Steiger was a buyer for Mr. Gillett, and made over 50 trips to Boston to buy goods when he could still use a half-fare ticket. The confidence placed in him by his employer increased Mr. Steiger's self-confidence and ability, and was among the foundation stones of his later success. . . . —*Springfield Republican.*

British Railway Accidents.

The report of the British Board of Trade for the year ending December 31 last shows 14 passengers, 5 employees and no other persons killed in train accidents, and 468 passengers, 115 employees and 8 other persons injured. The number of passengers killed is 9 less than in the preceding year, and of injured 643 less. Of the 14 passengers killed during the past year eleven were the victims of a single rear collision, at Pontypridd, on the Taff Vale Railway, January 23, when a passenger train ran into a standing freight, because of a failure of block working. Accidents of other kinds happening in connection with the movement of trains or cars, added to the foregoing, bring the totals up to 1,070 persons killed and 8,345 injured. This includes 84 persons killed at highway grade crossings and 462 trespassers killed. Under the head of trespassers there are included 215 killed and 21 injured who are classed as suicides.

Casualties unconnected with the movement of vehicles are not shown in the principal table, but appear in a footnote. Adding these to the totals of the table we have 1,159 persons killed and 32,258 injured, as compared with 1,121 killed and 30,110 injured in 1910.

President Ripley on Texas Law.

E. P. Ripley, president of the Santa Fe system, appeared before the Texas Welfare Commission at Ft. Worth, Tex., on May 21, advocating the repeal of the state stock and bond law as the first step in the betterment of Texas railway conditions. He especially urged a modification of that provision of the law that provides that no bonds shall be issued in advance of construction. He did not object to a rigid accounting to the state of the proceeds of bond issues, but contended that it was an actual compliance with the spirit of the law if the money so raised was spent on the property. In his opinion it would be better for the people of the state if all the railway lines were consolidated in management with the main systems.

Association of Railway Claim Agents.

At the twenty-third annual convention of the Association of Railway Claim Agents, held at Los Angeles, Cal., last week, officers were elected at follows: President, H. J. Franklin, claim agent of the Gulf, Colorado & Santa Fe, Los Angeles; vice-presidents, F. A. Hruska, of the New York Central Lines, Cleveland, S. H. Patterson, of the Pennsylvania Lines, Pittsburgh, and D. H. Kimball, of the Great Northern, St. Paul; secretary and treasurer, J. Roger McSherry, of the Chicago & Eastern Illinois, Chicago.

National Railway Mail Association.

This association held its annual meeting at New Orleans, May 23-25. The president for the ensuing year is Peter I. Schardt, Milwaukee; secretary, George A. Wood, Portsmouth, N. H.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRANE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomaston, Boston, Mass.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York; next convention, September 12, Seattle, Wash.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Detroit, Mich.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

AMERICAN ELECTRICAL RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOC.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn. Convention, July 9, Chicago.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Semi-annual, June 11, Atlantic City, N. J.; annual, October 21-25, Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York. Convention, June 25-26, Bluff Point, N. Y.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, September 10-13, Denver, Col.

National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railroad Club.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Business Association.—Frank W. Noxon, 2 Rector St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

Railway Industrial Association.—G. L. Stewart, St. L., S. W. Ry., St. Louis, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio.

Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling, Ill. September 10-13, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

Society of Railway Financial Officers.—C. Niquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, Aug. 27-30, Chicago.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The National Industrial Traffic League has issued a circular to members requesting them to telegraph or write to their representatives in Congress urging the adoption of the Pomerene substitute bill of lading bill.

For the first time in the history of the Memorial Day celebration at the National Cemetery, at Chalmette, La., near New Orleans, special trains were this year run to the cemetery. The Frisco ran trains hourly, beginning at noon.

At a recent meeting of the Central Passenger Association the Grand Trunk and Pere Marquette served notice that they will continue to make week-end and Sunday excursion rates this year. The Nickel Plate is considering doing so, but the other lines in the association will not.

A pocket-size pamphlet of 20 pages, entitled Corn Culture, to be distributed free by the freight department, is the latest agricultural venture of the Pennsylvania. The essay is fitted particularly to the state of Pennsylvania, and was prepared by the professors of the department of agricultural extension of the Pennsylvania State College. The farmers are told that on their lands the profit from an acre of corn is greater than in the western states, where corn is the principal crop.

The charging of storage on freight in freight houses is coming to be done in a more businesslike manner than formerly. The Intermountain Demurrage Bureau, headquarters at Salt Lake City, reports for the month of April that on the 20 roads within its territory storage was charged on 49,923 tons of freight, the amount collected being $976.77. This is equal to nearly one-seventh of the demurrage charges on cars of bulk freight assessed during that month ($7,423). The expenses entered as chargeable to the storage department aggregated $247.41. This leaves the net earnings $688.60, sums aggregating $40.76 having been refunded.

Relations Between Railways and Waterways.

The twelfth International Navigation Congress, which was in session in Philadelphia last week, has been mainly occupied with ocean navigation and details of the construction and operation of inland waterways rather than economic questions concerning the latter. At one business session, however, a resolution was adopted declaring that it was necessary that the public own and operate all wharves, docks, warehouses, and other facilities for handling freight for public use. The resolution set forth that the government should have some control in facilitating, combining, and harmonizing the transfer of freight between railways and waterways. The conclusion of the resolution was as follows:

"The co-operation of private railways with waterways should be secured by the effective regulation of railway services by national, state, and local governments. The legislative and administrative requirements of the several public authorities should so supplement each other as to make a unified transportation system of the railways and waterways in each country."

Freight Car Balance and Performance.

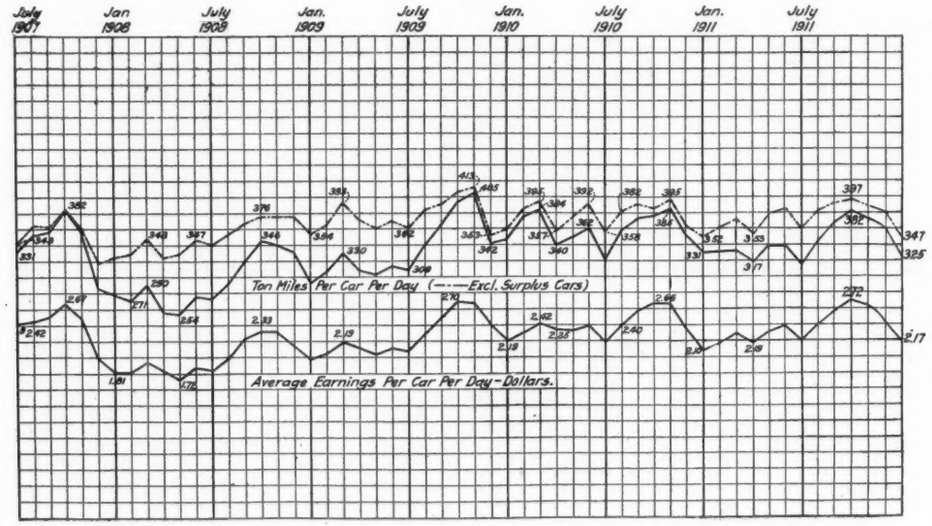
Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in presenting statistical bulletin No. 120, covering car balance and performance for January, 1912, says:

"So far as general results are concerned there was no marked difference in the performance for this month as compared with an average January performance. While the general homeward movement of cars increased the proportion of cars on home lines from 56 per cent. in December to 58 per cent. in January, the percentage of cars on home lines was the same as a year ago, and it will be noted that the per cent. of loaded mileage increased from 68.0 in December to 69.2 in January, compared with 67.2 in January, 1911.

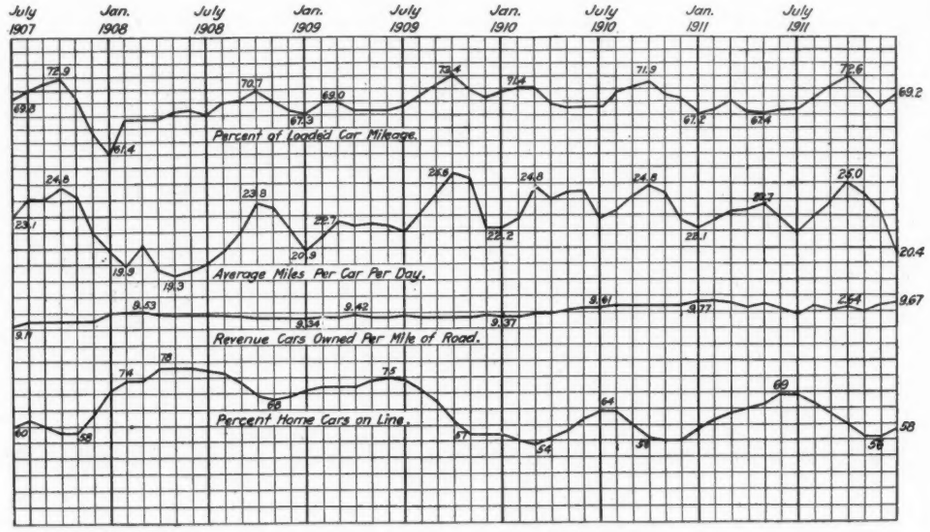
"The average miles per car per day decreased from 23.4 in December to 20.4 in January, compared with 22.1 in January, 1911. The ton miles per loaded car increased slightly over December (0.3), but there was a marked decrease in the average ton miles per car per day for all cars from 361 in December to 325 in January, as well as in the average miles per car per day,

FREIGHT CAR BALANCE AND PERFORMANCE IN JANUARY, 1912.

	New England.	N. Y., N. J., Del., Md., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., No. and So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minn.	Mont., Wyo., Neb., Dakotas.	Kan., Colo., Okla., Mo., Ark.	Texas, La., New Mex.	Ore., Idaho, Nev., Cal., Ariz.	Canadian Lines.	Grand Total.
Revenue freight cars owned	84,618	500,074	214,465	186,227	172,336	397,022	17,737	136,923	27,410	143,490	111,033	1,991,335
Average number of system cars on line	46,619	297,922	117,164	108,889	95,057	244,003	5,683	72,709	21,825	69,151	75,689	1,154,711
Railway-owned cars: Average foreign on line	41,428	165,000	96,796	63,112	74,323	131,319	13,826	57,386	29,952	56,533	44,567	774,242
Total Railway-owned cars on line	88,047	462,922	213,960	172,001	169,380	375,322	19,509	130,095	51,777	125,684	120,256	1,928,953
Excess	3,429	37,152	505	14,226	2,956	21,700	1,722	6,828	24,367	17,806	9,223	62,382
Per cent. of cars on line to total owned:												
Home	55	60	55	58	55	61	32	53	80	44	68	58
Foreign	49	33	45	34	43	34	78	38	109	38	40	39
All railways	104	93	100	92	98	95	110	91	189	82	108	97
Private cars on line	3,616	31,824	11,749	4,856	7,388	15,165	1,523	7,129	3,821	12,091	2,917	102,079
Total, all cars on line	91,663	494,746	225,709	176,857	176,768	390,487	21,032	137,224	55,598	137,775	123,173	2,031,032
Per cent. of cars in shop	6.83	5.75	6.42	6.47	7.38	6.58	4.96	8.25	4.54	4.58	5.66	6.37
No. of freight engines owned	1,428	10,427	3,049	3,145	2,767	6,417	525	2,709	732	2,693	2,146	36,038
Average cars on line per freight engine owned	70	63	74	56	64	61	40	51	76	47	57	56
Total freight-car mileage	49,085,404	467,988,494	126,130,240	123,353,547	108,030,786	230,844,735	20,433,679	84,455,793	36,664,433	110,069,783	75,590,812	1,432,647,706
Average miles per car per day	14.9	20.8	18.0	22.5	19.7	19.1	31.3	19.9	21.3	25.8	20.8	20.4
Per cent. loaded mileage	72.0	65.8	70.8	65.1	71.2	71.9	76.0	70.0	64.9	70.4	79.1	69.2
Ton-miles of freight, including company freight	569,803,241	7,955,429,436	2,198,765,837	1,906,545,021	1,531,119,097	2,757,135,818	351,299,473	1,211,203,230	356,223,892	1,570,858,047	1,277,597,027	21,685,980,119
Average ton-miles, including company freight:												
Per car-mile	11.6	17.0	17.8	15.5	14.3	14.9	17.7	14.3	11.7	14.5	16.1	15.7
Per loaded car-mile	16.1	25.8	25.1	23.7	20.1	21.1	23.2	20.7	17.8	20.6	20.3	22.8
Per car per day	184	368	321	349	283	290	566	299	248	372	335	325
Gross freight earnings	$6,191,119	$45,109,066	$11,613,004	$11,276,510	$10,904,522	$23,522,267	$2,183,645	$10,303,470	$3,852,200	$15,453,771	$7,809,581	$148,219,155
Average daily earnings: Per car owned	$2.12	$2.04	$1.75	$1.95	$2.04	$1.91	$3.97	$2.34	$4.53	$3.10	$2.27	$2.21
Per railway car on line	2.09	2.32	1.75	2.11	2.08	2.02	3.61	2.55	2.40	3.97	2.09	2.29
All cars on line	2.00	2.17	1.66	2.06	1.99	1.94	3.35	2.42	2.24	3.62	2.05	2.17



Car Earnings and Mileage, 1907 to 1912.



Car Performance, 1907 to 1912.

which is undoubtedly attributable to the unusually severe weather during the entire month of January. The average for this month was 6 ton miles per car less than it was in January, 1911.

"There was a decrease in the average earnings per car per day, the decrease being from $2.39 in December to $2.17 in January, and compared with January, 1911, an increase of 0.07 per car per day is shown."

The accompanying table gives car balance and performance in the month covered by the report, and the two diagrams show car earnings and car mileage and certain car performance figures monthly from July, 1907.

Variations in Stenciled Tare Weights.

In our issue of May 10, page 1064, was published a statement recently submitted to the Interstate Commerce Commission by A. S. Dodge, superintendent of the Western Railway Weighing Association and Inspection Bureau, showing that, of cars weighed by the association weighmasters during the year 1911 for the purpose of showing variations between the stenciled and actual tare weights, 73 per cent. had a stenciled tare exceeding the actual weight and therefore operated "to the advantage of the shippers." As the statement has been misconstrued in some quarters it should be stated that the term "shippers" was used in a broad sense in contradistinction to the carriers, and was not intended to signify that the benefit necessarily accrued to the consignor any more than to the consignee.

Agricultural Possibilities of the Canal Zone.

This is the subject of report No. 95 issued in pamphlet form by the Department of Agriculture, the work being the results of studies by H. H. Bennett and William A. Taylor. The conclusions are not very encouraging. Large farming operations are impracticable at Panama on account of the broken topography. Small farms, intelligently managed, would be possible. Crop rotation and scientific management would be absolutely necessary. Choice pineapples, mangos, and other tropical fruits and vegetables could be cultivated, the most hopeful prospect being to raise products which could be shipped to the United States at times when good prices could be secured. Corn, sugar cane, bananas and upland rice, also, cocoa, coffee and rubber are things for which the soil is probably well adapted. Government lands probably will be leased at $1.21 per acre per annum. Northern types of vegetables and other things could be adjusted to tropical conditions by selection and breeding. This would take a long time, but as the operation of the canal will call northern people to that region, there will be need of fruits and vegetables for such people to eat, as they will not be easily reconciled to tropical vegetable products.

Fifty-eight Dining Cars.

The Pennsylvania Railroad superintendent of dining-cars and restaurants has his office in the new station in New York City. Under his supervision there are 48 steel dining-cars, ten wooden cars and six station restaurants. The normal force of employees working under his direction is about 1,120. Last year there were 1,130,000 meals served in the dining-cars on this road (east of Pittsburgh), and 1,993,000 in the restaurants; a total of 3,123,000 meals, every one of which had to be duly recorded and checked against the amount of supplies given out and the cash receipts in the office of the superintendent.

The new Sunnyside yard on Long Island has the largest and best equipped dining-car plant in the world. In it is kept everything from a toothpick to the carcass of beef. A list of supplies issued one day recently to conductors by the storekeeper included 209 varieties of foods, drinks, cigars, cigarettes and miscellaneous articles, such as linen, cooking utensils, silverware and crockery.

When a car is put into service it is fitted with a standard equipment costing about $2,000. The steward is the captain of the dining-car crew, which consists of nine men besides himself, four cooks and five waiters. All the cooks and waiters employed by the Pennsylvania are colored, and the waiters are assigned to crews according to size and shade; the short mulattoes on one car and the tall blacks on another. When the meal begins, and they line up by their tables they present an even rank.—*Railroad Man's Magazine.*

INTERSTATE COMMERCE COMMISSION.

The commission has further suspended to December 1, 1912, the Toledo, St. Louis & Western's tariff, which contains advances in rates on soft coal from Illinois mines to stations on the St. Louis & Hannibal.

Reparation Awarded.

Atlantic Refining Co. v. Baltimore & Ohio et al. Opinion by the commission:

The rate of 15 cents per 100 lbs. on petroleum, C. L., from Philadelphia, Pa., to Utica, N. Y., reduced to 13½ cents per 100 lbs. (23 I. C. C., 492.)

R. R. Black v. Great Northern. Opinion by the commisison:

In this case the commission found that the rate of 46 cents per 100 lbs. charged the complainant for the transportation of bulk corn in carloads from Sioux City, Ia., to Hinsdale, Mont., was unjust to the extent that it exceeded 38 cents, and ordered that the latter rate be established in future. (23 I. C. C., 402.)

Henry E. Meeker v. Lehigh Valley. Opinion by Commissioner McChord.

In this case, the complainant sought reparation for shipments of coal from the Wyoming coal region in Pennsylvania to Perth Amboy, N. J., on which it was charged rates which were found unreasonable in *Meeker v. Lehigh Valley*, 21 *I. C. C.*, 129. (23 I. C. C., 480.)

Frank Simpson Fruit Company v. Wells Fargo & Company. Opinion by the commission:

On a shipment of 400 cases of eggs, each case containing 30 doz. eggs, the complainant was charged at the rate of $3 per 100 lbs., applied to a total weight reached by estimating the weight of each case at 55 lbs. The complainant argues that each of the cases weighed 53 lbs., and that it should have been charged accordingly. The commission decided that the estimated weight of 55 lbs. for a case containing 30 doz. eggs was excessive, and that the tariff of the defendant should be changed to make the estimated weight 53 lbs. (23 I. C. C., 412.)

Complaint Dismissed.

Reno Grocery Co. v. Southern Pacific. Opinion by Commissioner Lane:

The joint rate under which this shipment moved not having been attacked, and the proper parties defendant not having been joined, the complaint must be dismissed. (23 I. C. C., 400.)

New Orleans Board of Trade v. Louisville & Nashville et al. Opinion by Commissioner Clements:

The rate on pig iron from Birmingham, Ala., to New Orleans, La., is not found to be unreasonable or discriminatory. (23 I. C. C., 429.)

C. M. McClung & Co. et al v. Louisville & Nashville et al. Opinion by the commission:

The rate on carload shipments of sheet-iron roofing from Newport, Ky., and Cincinnati, Ohio, to Knoxville, Tenn., is not unreasonable or discriminatory. (27 I. C. C., 414.)

Blodgett Milling Co. v. Chicago, Milwaukee & St. Paul et al. Opinion by Commissioner Meyer:

While the commission will refuse to permit discrimination through the use of transit privileges, it finds that the difference between the transportation of grain products from Minneapolis and St. Paul to the Pacific coast is so unlike the transportation conditions from Janesville, Wis., that the railways are warranted in affording milling and transit rates at Minneapolis and St. Paul that they do not give at Janesville. (23 I. C. C., 449.)

Alfred Jouannet v. Atlantic Coast Line et al. Opinion by Commisisoner Harlan:

In this case the complainant alleges that the rate of $0.45 per crate, holding 1½ bushels of vegetables, from Charleston, S. C., to New York was excessive. While this case was pending, the defendants withdrew the any-quantity rates and substituted a carload rate of $0.42 per 100 lbs., and a less-than-carload rate of $0.46 per 100 lbs. The commission held that these latter rates were not unreasonable. The complaint was dismissed. (23 I. C. C., 392.)

Definition of Granulated Cork.

Fred W. Wolf Co. v. Mallory Steamship Co. et al. Opinion by the commission:

A shipment of cork for use in an ice making plant was charged the rate for cork shavings. Granulated cork is the by-product after punching out cork from the bark and weighs about 100 lbs. to a three-bushel bag, while a three-bushel bag of cork shavings weighs only about 35 to 40 lbs. The shipment in question was granulated cork, taking the first-class rate, as against the double first-class rate applicable on cork shavings. (23 I. C. C., 490.)

Special Rate on Second Hand Articles Refused.

Minneapolis Traffic Association et al v. Chicago & North Western et al. Opinion by Commissioner Clements:

Complainants in the present proceedings asked an order reestablishing half rates on returned shipments damaged in transit, and also on returned articles, simply because they are returned articles and are shopworn or out of repair. The commission adheres to its ruling *in re rates on returned shipments* 19 *I. C. C.*, 409. The difficulty of determining the value of returned articles, and how much they have depreciated in value, is very great. Moreover, the commission is not prepared to lay down the principle that old or second hand articles must be treated differently from new, or that the value of the article is the controlling element in making rates. The complaint therefore is dismissed. (23 I. C. C. 432.)

Import Rates from Philadelphia.

Joseph E. Thropp v. Pennsylvania Railroad et al. Opinion by Commissioner McChord:

A rate of $1.45 per gross ton on ore from Buffalo, N. Y., to Mount Dallas, Pa., and Saxton, not found to have been unreasonable or unjustly discriminatory. Much of complainant's disadvantages appears to be due to the adjustment of import rates from Philadelphia, which rates the complaint failed to attack. The case held open to permit a readjustment of rates or the filing of an amended petition. (23 I. C. C., 497.)

Commission Very Much Modifies Its Findings in Proctor & Gamble Case.

Fels & Co. v. Pennsylvania Railroad et al. Opinion by Commissioner Lane:

The complaint is against eight companies, and asks for reparation on L. C. L. shipments of soap from Philadelphia to official classification territory points. The complainant relies on the sweeping decision in Proctor & Gamble v. Cincinnati, Hamilton & Dayton, 9 I. C. C., 440. The two points to be decided are, first, whether the findings of the commisison in the Proctor & Gamble case may be considered as making the fourth-class rate a criterion of reasonableness on L. C. L. shipments of soap, by which any or all railways in official classification territory should have been guided after April 10, 1903; secondly, if the first question is decided in the affirmative, has the claim been barred by the statute of limitations. At the time the Proctor & Gamble case was decided the commission had no authority to prescribe rates for the future. It is, perhaps, not surprising that the complainant has been misled by the sweeping character of the findings in Proctor & Gamble. In stating its conclusion in that case the commission said that "the chief question here is as to the justice of the change in the classification of soap, not only as regards Proctor & Gamble, but as affecting all soap shippers in this classification territory."

It is very clear, however, that the commission in that case had no warrant for announcing such broad findings. While the opinion in the Proctor & Gamble case purports to make findings of fact as to the application of rule 26 by all railways in official classification territory, its findings as a basis for the awarding of damages can be applied only to the extent of the particular railways which were in that case before the commission. Therefore, the Baltimore & Ohio is the only one of eight roads against which the present complaint can be considered.

While the original complaint was not well drawn, it was sufficient to state a good cause of action, and therefore stop the running of the statute of limitation. Reparation against the Baltimore & Ohio, based on rule 26, is awarded.

Commissioner Clark dissenting:

I am not able to agree with the majority report for the reason that it proposes reparation on the basis of fourth-class rates, which is not now, and has not been since January 1, 1900, the lawful classification of such shipments. I feel that the maximum amount of reparation that can properly be awarded is measured by the difference between the rates which it did pay and the rates which it would have paid under the present rule 28. (23 I. C. C., 483.)

Galveston Wharf Co. Losses.

In re wharfage charges of the Galveston Wharf Company. Opinion by Commissioner Harlan:

The order suspending a tariff of the Galveston Wharf Company increasing its charges on traffic moving over its piers made permanent, and the petition of the Texas City Terminal Company for increased divisions denied. The trunk line carriers ordered to correct discriminations in the allowances made out of the rate to the two companies.

A commission of 1½ cents a bale paid by the terminal line to a broker for routing cotton for export through the port of Texas City is an unlawful concession from the rate. A subsidy paid to certain ocean carriers to enable them to offer shippers a lower ocean rate from Texas City than from Galveston operates as a rebate and is unlawful.

Free wharfage is a legitimate means of making a port attractive to ocean lines, and the Texas City interests in pursuing that policy will be protected against any coercion by the carriers. (23 I. C. C., 535.)

Withdrawal of Proportional Rates Upheld.

Wisconsin State Millers' Association v. Chicago, Milwaukee & St. Paul et al. Opinion by Commissioner Harlan:

The withdrawal of proportional rates on grain and grain products from Kansas City, Omaha and Council Bluffs to certain milling points in central and eastern Wisconsin leaving local rates only in effect held not to result in any unlawful discrimination in favor of Chicago and Milwaukee millers. (23 I. C. C., 494.)

Slightly Advanced Milk Rate Approved.

In re suspension of an advance in the rate by the Delaware & Hudson for milk. Opinion by Commissioner Clements:

Proposed advanced rate from Poultney, Vt., Rupert and West Pawlett, and Cambridge, N. Y., Granville, Middle Granville, Salem and Shushan, to Eagle Bridge, N. Y., on milk in carloads destined to Boston, Mass., found to be unreasonable to the extent it exceeds the rate prescribed herein, which permits a slight advance in the present rate. (23 I. C. C., 500.)

Grievances Adjusted Through Lease.

Gay Coal & Coke Co. et al. v. Chesapeake & Ohio et al. Opinion by Commissioner Clements:

The complainants in this case have claimed that certain charges and arrangements which the Chesapeake & Ohio had made with them in regard to switching coal cars were improper. Since the filing of the case, however, the Chesapeake & Ohio has executed a lease to the satisfaction of the Island Creek Railroad and has taken over the operation of that road, and the commission is informed that the execution of this lease will remove all causes of complaint. The case is therefore dismissed without prejudice. (23 I. C. C., 471.)

Discrimination in Export Rates.

New Orleans Board of Trade, Ltd., v. Illinois Central et al. Opinion by Commissioner McChord:

The rate on transportation of unmanufactured tobacco from Henderson, Ky., and Owensboro to New Orleans for export is lower when destined to Liverpool, England, and Bristol than when destined to other European points. The defendants claim that this adjustment of rates is to meet competition through Atlantic seaboard points, and that conditions surrounding the transportation of tobacco to European ports as contrasted with Liverpool and Bristol are so similar as to warrant the existing dif-

ference in export rates. The difference in conditions is beyond the export point. The right claimed by the defendant would afford unlimited opportunity to discriminate between shippers of tobacco in the United States. If one grower of tobacco sends his traffic to London, and another to Bristol, and the railway desires to favor the latter, all that would be necessary would be for it to publish a 15-cent rate on the traffic destined to Bristol, and a 20-cent rate on the traffic destined to London. While it has been decided that a lower rate may be granted on export traffic than on traffic destined only to the seaboard, it has not been decided that a difference may be made as between different export rates, because of different final destinations, and in this case we cannot find a substantial enough dissimilarity between the conditions applying on traffic destined to Liverpool and Bristol, and to other points to warrant the discrimination complained of. No reparation is at present awarded, but further testimony may be introduced. (23 I. C. C., 465.)

STATE COMMISSIONS.

The New York Public Service Commission, Second District, has ordered the New York, Ontario & Western to reduce from 50 cents a ton to 40 cents its rate on ice in carloads from Mechanicstown to Middletown; but if the complainants do not ship at least 24 carloads during the coming twelve months, the higher rate may thereafter be restored. The length of the haul is about four miles.

The Mississippi commission, reporting its valuation of the railways of the state, shows a total of about $20,000,000 greater than the valuation of last year. The main line of the Illinois Central has been raised from $18,000 a mile to $27,000 a mile; Mobile & Ohio, main line $14,000 to $25,000; branches $7,500 to $9,000; Southern Railway, $8,500 to $14,000; Gulf & Ship Island, $10,000 to $15,000.

The New York Public Service Commission, Second District, has ordered the New York Central to refund 75 cents to each user of a commutation ticket between certain points on the Rome, Watertown & Ogdensburg and Rochester, the tickets having by inadvertence been sold at too high a price. The road obtained permission to abandon trains on the line from Windsor Beach to Rochester and to carry passengers to Rochester by a route about two miles longer, without change of fare. The excessive fare was charged for three months. The company is ordered to notify each holder of a monthly ticket of its willingness to refund the 75 cents.

COURT NEWS.

The supreme court of Texas, considering the question of the legal right of the Kansas City, Mexico & Orient to move its shops and general offices from Sweetwater to San Angelo, has decided in favor of the road. The court makes permanent its writ of prohibition by which the district court at Sweetwater is enjoined from further hindering the enforcement of the judgment of the supreme court in favor of the road and permitting the removal of its shops and general offices.

There are three electric railways in operation at present in Scandinavia. Two of them are narrow gage and one is a small suburban line in Sweden, from Borensberg to Klokricke. The other is in Norway and runs between the towns of Tamshavn and Lokken-Tromdheim. The length of this line is 15 miles. On the third, which is a standard gage line, traffic was begun in the summer of 1911. This line is in the midst of the chemical industry of Norway, in the province of Telemarken. It is partly opened for traffic between the town Nottoden and the Lake of Tinn. It is 18 miles long and the tension in the conductor is 11,000 v. The trains are made up with a motor car at each end, which is a common system in Norway. The line gets its current from its own motor generator sub-station, and the power is obtained from the Svalgfos establishment. The three phase current of 11,000 v. is transformed into single phase. The sub-station is near the station of Svalgfos, which is situated about 15 miles from one end of the line and 3 miles from the other.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

W. A. Webb, general manager of the Texas Central, at Waco, Tex., has been appointed assistant to president of the Missouri, Kansas & Texas of Texas, with headquarters at Dallas.

George T. Reid, vice-president of the Spokane, Portland & Seattle at Tacoma, Wash., has been appointed assistant to the president and western counsel of the Northern Pacific, with office at Tacoma.

E. J. Chamberlin, vice-president and general manager of the Grand Trunk Pacific has been elected president of the Grand Trunk and the Grand Trunk Pacific, and also a member of the Grand Trunk board, succeeding Charles M. Hays, deceased. An account of his life is given on a preceding page. William Wainwright, second vice-president of the Grand Trunk Pacific, has been elected first vice-president of the Grand Trunk Pacific, remaining also vice-president of the Grand Trunk. M. M. Reynolds, third vice-president of the Grand Trunk Pacific, has been made second vice-president of the Grand Trunk Pacific, remaining also a vice-president of the Grand Trunk and becoming a director of the Grand Trunk Pacific.

Operating Officers.

A. A. Stebbins, superintendent of the Barre Railroad, at Barre, Vt., has been appointed superintendent of the Montpelier & Wells River.

The office of R. A. Easley, road supervisor of the Nashville, Chattanooga & St. Louis, has been transferred from Wartrace, Tenn., to Tullahoma.

J. R. Dillon has been appointed general manager of the Texas City Terminal Company and the Texas City Transportation Company, with office at Texas City, Tex.

F. A. Parker has been appointed chief despatcher and division operator of the Iowa division of the Rock Island Lines, with office at Des Moines, Iowa, succeeding T. W. Ward, resigned.

P. T. White, assistant despatcher on the Cleveland division of the Cleveland, Cincinnati, Chicago & St. Louis, has been appointed trainmaster, with office at Indianapolis, Ind., succeeding F. E. Jones, who has been made terminal trainmaster at Indianapolis.

Charles L. Bent has been appointed inspector of passenger train and station service, so far as it relates to the care and convenience of passengers, of the Illinois Central and the Yazoo & Mississippi Valley, with office at Chicago, succeeding Robert E. Mills, resigned.

W. S. Becker, superintendent of the Pocahontas division of the Norfolk & Western, at Bluefield, W. Va., has been appointed general superintendent of the Western General division, succeeding George P. Johnson, whose resignation has already been announced in these columns. W. J. Jenks, chairman of the company's car allotment commission, has been appointed superintendent of the Pocahontas division, succeeding Mr. Becker, both with offices at Bluefield.

Edmund I. Bowen, whose appointment as superintendent of the Rochester division of the Erie has been announced in these columns, has been appointed also superintendent of the Bath & Hammondsport and the Lake Keuka Navigation Company, with headquarters at Rochester, N. Y. Mr. Bowen was born at Williamsport, Pa., and was educated at Rensselaer Polytechnic Institute, Troy, N. Y. He began railway work in July, 1890. For two years he was assistant engineer of the western division of the New York, Lake Erie & Western, now the Erie, and then for one year was supervisor. He was then appointed roadmaster of the western division, and later was made division engineer of the same road. In June, 1903, he was appointed trainmaster of the Allegheny division of the Erie, and in August, 1906, his jurisdiction as trainmaster was extended over the Bradford division. The same year he was made acting superintendent of the

Allegheny and Bradford divisions of the same road, and in January, 1907, he was appointed superintendent of both those divisions. Mr. Bowen was promoted to superintendent of the Delaware and Jefferson divisions, with headquarters at Susquehanna, Pa., in July, 1908, which position he held at the time of his recent appointment as above noted.

John William Dean, assistant superintendent of transportation of the Missouri Pacific-Iron Mountain system at St. Louis, Mo., has been appointed general superintendent of the Southern district, with office at Little Rock, Ark., succeeding M. M. Richey, resigned. Mr. Dean was born January 15, 1867, near Lexington, Mo., and he received a common school education. He began railway work with the Chicago & Alton in 1877, and was with that road for five years, having been messenger, operator and agent During 1882 and 1883 he was with the Kansas City, Fort Scott & Memphis, now part of the Frisco, as operator and brakeman, and then until 1886 was with the Missouri Pacific as copy operator in the despatcher's office. He went to the Atchison, Topeka & Santa Fe in 1887, and remained with that road until 1902, having been consecutively operator, brakeman, yardmaster, despatcher, chief despatcher and trainmaster. During 1902 and part of 1903 he was trainmaster and superintendent of terminals of the Denver & Rio Grande, and was then until September, 1910, consecutively superintendent of the Colorado & Southern, superintendent of the Mexican National, trainmaster of terminals of the Illinois Central at Memphis, Tenn., superintendent of the Missouri Pacific from 1905 to November 22, 1909, and general superintendent of the Denver & Rio Grande from the latter date until he resigned in September, 1910. He subsequently returned to the Missouri Pacific as assistant superintendent of transportation, from which office he has just been promoted.

John W. Dean.

Traffic Officers.

N. E. Mann has been appointed general agent of the Atchison, Topeka & Santa Fe, with office at Leavenworth, Kan., succeeding E. E. Hook, transferred.

A. J. Ribe has been appointed freight soliciting agent of the Southern Railway, with office at Birmingham, Ala., succeeding J. B. Dunlap, transferred.

R. W. Owens, general agent of the Wabash Railroad, at Denver, Colo., has been appointed assistant general freight agent, with office at Kansas City, Mo., succeeding J. D. Lund, transferred to Denver as general agent in place of Mr. Owens.

Oscar Townsend, assistant general freight agent of the Chicago Great Western, with office at St. Paul, Minn., has been appointed general freight agent with office at Chicago, succeeding G. O. Somers, resigned to engage in other business.

R. E. Lay has been appointed traveling freight agent of the Galveston, Harrisburg & San Antonio, the Texas & New Orleans, the Houston & Texas Central, the Houston, East & West Texas and the Houston & Shreveport, with office at Dallas, Tex.

T. J. Faulconer has been appointed traveling freight agent of the Lake Erie & Western, with office at Indianapolis, Ind., succeeding Walter A. Smith, resigned. This corrects the statement in our issue of May 10, page 1073, that Mr. Faulconer had been appointed soliciting agent of the Kanawha Despatch at Indianapolis.

W. C. Shannon has been appointed commercial agent of the Merchants & Miners Transportation Company, with office at St. Louis, Mo., succeeding S. S. Dudley, resigned to go into other business. Charles E. Thomas, Jr., soliciting agent, with office at Philadelphia, Pa., has been appointed soliciting agent with office at Boston, Mass., succeeding Lloyd O. Miller, promoted. T. V. Blackburn, soliciting agent at Philadelphia, succeeds Mr. Thomas; and T. M. Shaw has been appointed soliciting agent, with office at Philadelphia, succeeding Mr. Blackburn. Effective June 1.

Julien L. Eysmans, who has been appointed assistant general freight agent of the Pennsylvania Railroad, as has been announced in these columns, was born in Brussels, Belgium, March 18, 1874, and was educated in the public schools of Baltimore, Md. Mr. Eysmans entered the service of the Pennsylvania Railroad as a messenger in the office of the division freight agent at Baltimore May 1, 1891, and in October, 1893, he was transferred to Washington, D. C., as a clerk. In July of the following year he returned to Baltimore as a clerk, and on August 1, 1896, he was appointed freight solicitor. He was made agent of the Anchor Line at Baltimore, in April, 1899, and the following March became freight solicitor at Reading. Three years later he was appointed district freight solicitor at Baltimore, and on January 1, 1904, he became eastern superintendent of the Star Union Line at New York. Mr. Eysmans was promoted to general freight agent of the Cumberland Valley in February, 1906, and on June 1, 1911, was made division freight agent of the Pennsylvania Railroad at Pittsburgh, which position he held at the time of his recent appointment as assistant general freight agent of the same company, with office at Philadelphia.

Engineering and Rolling Stock Officers.

Charles Hamilton has been appointed consulting engineer of the Nevada-California-Oregon Railway and the Sierra & Mohawk, with office at Reno, Nev.

Walter H. Flynn, division master mechanic of the Michigan Central at St. Thomas, Ont., has been appointed superintendent of motive power, with office at Detroit, Mich., succeeding E. D. Bronner, promoted to general manager. T. J. Burns, assistant to the superintendent of motive power at Detroit, has been appointed assistant superintendent of motive power. E. R. Webb, division master mechanic at Michigan City, Ind., has been transferred to St. Thomas, succeeding Mr. Flynn, and W. H. Corbett, road foreman of engines at Jackson, Mich., succeeds Mr. Webb.

M. J. Drury, whose appointment as superintendent of shops of the Atchison, Topeka & Santa Fe, with office at Topeka, Kan., has been announced in these columns, was born May 24, 1849, at Berkenhead, Eng. He came to this country with his parents when he was three years old, and received a common school education at Parkersburg, W. Va. In 1886 he entered a contract shop as a machinist apprentice, and in 1870 began railway work with the Baltimore & Ohio at Grafton, W. Va., with which company he remained for ten years, working at Grafton, Newark, Ohio, and at Chicago. He was then made a machinist for the Missouri, Kansas & Texas at Parsons, Kan., and was later gang foreman and machine foreman on that road. In 1887 he went with the Lake Shore & Michigan Southern at Elkhart, Ind., as a machinist, and the next year went to the Denver & Rio Grande as night foreman. On February 1, 1889, he went with the Atchison, Topeka & Santa Fe, with which road he has been ever since. He was consecutively machinist gang foreman, general foreman first at La Junta, Colo., and later at Arkansas

M. J. Drury.

City, Kan., and division foreman on the Oklahoma division at Arkansas City. He was appointed master mechanic at Winslow, Ariz., in October, 1902, and was transferred with the same title to Raton, N. Mex., in May, 1906. On November 1, 1906, he was appointed mechanical superintendent of the Western lines, with headquarters at La Junta, from which position he was recently promoted to superintendent of shops as above noted.

OBITUARY.

John F. Trout, superintendent of dining cars and restaurants of the Pennsylvania Railroad, died on May 23 at his home in Jersey City, N. J., of heart failure. Mr. Trout was born at Landisville, Pa., in August, 1843.

J. M. Lee, formerly superintendent of the San Antonio Branch division of the Galveston, Harrisburg & San Antonio at San Antonio, Tex., and recently chief engineer of the Oklahoma Corporation Commission, died at Houston, Tex., on May 21.

Dan Shea, general foreman of masonry, with jurisdiction over all Erie lines west of Salamanca, N. Y., was killed on May 17, being struck by a train at Cambridge Springs, Pa, while traveling on a motor car. Mr. Shea had been with the Erie for 47 years, and had been general foreman of masonry for 30 years.

From 1895 to 1908, the operating ratio on the Austrian railways increased from 66 per cent. to 76 per cent.; on the Bavarian state railways from 55 per cent. to 71 per cent.; on the Prussian state railways from 65 per cent. to 72 per cent. During that period, this ratio on the Hungarian state railways increased from 55 per cent. to 77 per cent., and in 1910 reached 81 per cent. The large increases in the expenses on the Hungarian state railways counteracted the enormous growth of traffic during that period.

The increase in salaries on the Hungarian state railways since 1893 has been one of the principal causes of the poor showings that have been made by that system. These salaries have increased $4,400,000 since 1903 and form a serious drain on the railway budget. Another cause of the poor showing made, is the higher cost of materials and supplies of all kinds; from 1905 to 1909 these expenses increased $2,614,000. The price of ties increased 53 per cent., but the increase in cost of fuel has been one of the largest factors in the increase of expenses. This is due not only to the increase of the cost of fuel itself, but also to the increase of fuel needed to move a given tonnage a given distance.

During the past few years, the maintenance cost of engines and cars on the Hungarian state railways has increased enormously. In 1909, the maintenance per locomotive was $600, and in 1909, $910. During this period, the maintenance cost of a passenger car increased from $128 to $164, and that of a freight car from $19 to $27. The total maintenance of equipment in 1909, cost $3,440,000 more than in 1905. This was partly due to the higher cost of labor, and partly to the heavier use to which the equipment was put. In spite of this carloading instead of increasing, fell from 48 per cent. of capacity to 37 per cent. of capacity. This state of affairs is partly attributory to the adoption of 15-ton cars, but although 56 per cent. of the cars now in operation are of that capacity, the shippers are obliged to pay premiums to have those cars loaded to full capacity.

One of the principal obstacles to the successful development of traffic on the Hungarian state railways, is the lack of double tracks and the poor station facilities. The new double-tracked lines, which were regarded as indispensable from a strategic point of view, were built almost entirely on that account. The lack of proper station facilities is such that long trains are obliged to enter some stations in two sections; a fact which, added to the lack of extra tracks, causes numerous and serious delays. The stations at Budapest are in a particularly deplorable condition. During the past 20 years the passenger traffic increased 550 per cent. at the east station and 900 per cent. at the west station, and the number of trains arriving and leaving, increased from 140 to 290. Freight traffic at those two stations increased 100 per cent. during that period, but in spite of these enormous increases, the conditions at those stations have scarcely shown any improvement in the last 20 years.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Montpelier & Wells River is in the market for 1 passenger locomotive.

The Hocking Valley has ordered 5 mikado locomotives and 2 ten-wheel locomotives from the American Locomotive Company.

The Cuba Railroad, New York, has ordered 4 ten-wheel locomotives from the American Locomotive Company. The dimensions of the cylinders will be 18 in. x 24 in.; the diameter of the driving wheels will be 52 in., and the total weight in working order will be 127,000 lbs.

The Chicago Junction Railway has ordered 6 six-wheel switching locomotives from the American Locomotive Company. The dimensions of the cylinders will be 20 in. x 26 in; the diameter of the driving wheels will be 51 in., and the total weight in working order will be 148,000 lbs.

The Cambria Steel Company, Johnstown, Pa., has ordered 1 six-wheel switching locomotive from the American Locomotive Company. The dimensions of the cylinders will be 19 in. x 26 in.; the diameter of the driving wheels will be 50 in., and the total weight in working order will be 125,000 lbs.

CAR BUILDING.

The Central of New Jersey is in the market for 1,000 gondola cars.

The Montpelier & Wells River is in the market for 3 coaches and 7 refrigerator cars.

The Cuba Railroad, New York, is in the market for 100 box cars, 50 flat cars and 10 dump cars.

The Mineral Point Zinc Company has ordered 41 tank cars from the German-American Car Company.

IRON AND STEEL.

The Louisville & Nashville is in the market for 8,000 tons of bridge material.

The Chicago, Milwaukee & St. Paul has given an order for 5,000 tons of bridge material to the American Bridge Company.

General Conditions in Steel.—New business in finished steel is sagging, while specifications on contracts continue to occupy the mills at almost full capacity. Many of the mills are far behind in shipments and are not making any effort to increase their already large tonnages. Manufacturers welcome the shrinkage in orders for certain classes of steel as it will give them an opportunity to catch up with specifications. Prices for the finished products are holding firm with premiums for bars and plates for prompt delivery. It is generally believed that the present lull in the volume of new business will continue until a better estimate of the crops can be obtained.

SIGNALING.

New Installations of Block Signals, Interlocking, Telephones for Train Despatching, Etc.

The New York, Chicago & St. Louis is preparing to introduce automatic block signals throughout its line in Indiana, 150 miles, the signal to be installed by the American Railway Signal Company of Cleveland.

The Argentine port of San Antonio and the Chilian port of Valdivia are to be connected by means of a new railway connecting up with the Patagonian system. Both governments seem to be favorable to the carrying of the project. Bailey Willis, a resident of Buenos Ayres, Argentina, is the promoter of the enterprise.

Supply Trade News.

John G. Platt, mechanical representative of the Hunt-Spiller Manufacturing Corporation, Boston, Mass., has been made sales manager, with office in Boston. This is a newly created position.

The MacArthur Concrete Pile & Foundation Company, New York, has received an order from the Boston & Maine for 2,700 pedestal concrete piles, together with a large amount of concrete capping, etc., for the new shops of that road at North Billerica, Mass.

Robert Law, formerly general manager of the Missouri lines of the Chicago, Burlington & Quincy, and more recently vice-president and general manager of the Colorado & Northwestern, has recently become connected with the United Car Company of Chicago, as vice-president and general manager.

The Duntley Pneumatic Tool Company of Chicago has been incorporated under the laws of Delaware by J. W. Duntley and his associates, with a capitalization of $100,000. The company has entered into a contract with the Gibbons & Lewis Company of Fond du Lac, Wis., for the manufacture of a full line of pneumatic tools and the Duntley Manufacturing Company of Chicago will act as the selling agency.

The General Electric Company, Schenectady, N. Y., has received the following orders from the Boston Elevated: Five hundred motors of the split frame type; 200 K-28 controllers; 75 four-motor car equipments, each including motors and controllers; one 15,000-k.w. Curtis turbo generator for the South Boston power station. This turbo generator will be a duplicate of the two units now being installed, generating current at 6,600 v. and stepping up by compensators to 13,200 v.

James Stewart Andrews, vice-president of the Blair Engineering Company, New York, died at Cleveland, Ohio, on May 22. His death was wholly unexpected, as Mr. Andrews was supposed by himself and by his family and friends to be in robust physical condition. For several years prior to 1908 Mr. Andrews was a prominent figure in the railway supply business, which he entered under the tutelage of Harry W. Frost, about 1897, in the service of the Monarch Brake Beam Company. By hard work, a genial disposition and marked intelligence, Mr. Andrews made his way rapidly. He had a peculiar gift for selling things. In 1901 he joined Albert Waycott in the Waycott-Andrews Supply Company, St. Louis, Mo. This connection lasted a year, and then Mr. Andrews, with some friends, organized the Commonwealth Steel Company, St. Louis, of which he became vice-president. When this organization was acquired by Clarence H. Howard and his associates, Mr. Andrews retired from the company. Mr. Andrews in the meanwhile had acquired a number of patents and had developed among other things, the Andrews side frame, which was sold to the American Steel Foundries, New York, in 1906, at which time Mr. Andrews entered the sales department of that company. When, having acquired a very comfortable fortune, Mr. Andrews retired from the service of the American Steel Foundries, he talked seriously of returning to his native country and living the quiet life of a country gentleman. Mr. Andrews was born in Coleraine, Ireland, on April 9, 1864, so that when he entertained these pleasant expectations he was a comparatively young man. His youth and vigor, as well as the business habits of an active life, were too much for him, however, and he was very soon in active business again, having joined Thomas S. Blair in the organization of the Blair Engineering Company, of which he was vice-president at the time of his death. Mr. Andrews had also at one time been president of the Metal Ties Company, which is no longer in existence. He was buried at Easthampton, L. I., on May 24.

J. S. Andrews.

On May 27 the Supreme Court for the District of Columbia entered a final decree dissolving the injunction and dismissing the suit in the case that Peter H. Murphy brought against the Baltimore & Ohio for infringement of his car roof patents. This case was noticed in the *Railway Age Gazette,* of December 15, 1911, page 1256, and May 10, 1912, page 1056. The roofs were furnished by the Chicago-Cleveland Car Roofing Company, which protected the Baltimore & Ohio in defending the suit. This final decree was in accordance with the decision of the Court of Appeals for the District of Columbia, which, on April 22 last, entirely reversed the previous decree of the lower court. The previous decree had held that the patents were valid and infringed upon, but the Court of Appeals wholly reversed it, and also, on May 14, denied Mr. Murphy's petition for a rehearing. On May 17 the Court of Appeals also overruled Mr. Murphy's opposition to granting the Baltimore & Ohio a large item of recoverable costs of the suit. There was also on April 29 a ruling of the Supreme Court of the United States that precluded any further appeal in such a suit. The Baltimore & Ohio was thus entirely sustained in the matter.

J. F. MacEnulty, who, as announced in last week's issue, has been appointed general sales manager of the Western Steel Car & Foundry Company and of the Pressed Steel Car Company, with office at New York, was born in Pittsburgh, Pa., January 10, 1879. In 1899 he entered the service of the Pressed Steel Car Company at Pittsburgh as inspector, and later became foreman of the truck and bolster department, chief inspector and engineer of construction. He was then transferred to New York as sales agent, and about six years ago went to Chicago as general superintendent of the Western Steel Car & Foundry Company. In 1909 he was made general manager, which position he now leaves to take charge of the sales department in New York. The position of general sales manager of the Pressed Steel Car Company and of the Western Steel Car & Foundry Company, is a newly created position, as was previously mentioned.

J. F. MacEnulty.

The report of the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., for the year ended March 31, 1912, shows that gross earnings were $34,196,446, as compared with $38,119,312 in 1911. The net manufacturing profits were $3,591,596 as compared with $5,608,765 in 1911. The gross income in 1912 was $4,752,038 as compared with $7,124,296 in 1911. The net income, applicable to interest and other charges, in 1912 was $4,043,121 as against $6,466,592 in 1911. The surplus for the year 1912 was $2,444,093 as compared with $4,881,105 in 1911. In 1912 5.9 per cent. was earned on the common stock after deducting the full 7 per cent. dividend on the preferred stock. This compares with 12.3 per cent. earned on the common stock in 1911. As the year 1911 was the most profitable of the last six years, the earnings for 1912 compare more favorably with the other years since 1906. Guy E. Tripp, chairman of the board of directors, says, in part, that the decrease in gross earnings in 1912 was due partly to actual reduction of output, but to a greater extent to the lower prices obtained. The value of unfilled orders on March 31, 1911, was $7,616,058 as compared with $8,137,961 on March 31, 1912. During the month of April, the

value of orders booked exceeded that of any month during the year ended March 31, 1912, so that the value of unfilled orders on April 30, 1912, was $9,218,303. The surplus on March 31, 1911, was $5,964,225. This balance was increased by the net income for the year, $2,244,093, to a gross surplus of $8,331,276. Dividends of 7 per cent. on the preferred stock and 1 per cent. on the common stock reduced the surplus to $7,699,250, against which depreciations of investments were written off as follows: Westinghouse Electric Company, Ltd., stock, $250,000; Societe Electrique Westinghouse de Russie debentures, $243,243; Lackawanna & Wyoming Valley Rapid Transit bonds, $557,042. As a result of these depreciations, the surplus on March 31, 1912, was $6,648,964. The value of the property and plant increased $1,503,042 over the previous year. This increase is chiefly due to the completion of the extensions of the buildings on the additional ground purchased for the plant at Newark, N. J.; also to the purchase of a new plant at Pittsburgh, Pa., by the R. D. Nuttall Company; also to the erection of a new building and other general improvements at the East Pittsburgh works. The buildings already erected have resulted in a considerable increase in the capacity and efficiency of each of these plants. As a result of sinking fund payments made during the year, there were retired a total of $537,000 face value convertible bonds and $260,000 face value debenture certificates. The British, French and Canadian Westinghouse companies, in which the Westinghouse Electric & Manufacturing Company has the largest investments, have improved in net profit during the year ended December 31, 1911, as compared with the previous year. The Italian company has suffered because of the war between Italy and Turkey. The assets of the company include, property and plant, $19,195,188; investments, $23,384,516; total current assets, $19,848,706; of which $8,340,081 was cash on hand, $3,395,426 was notes receivable, and $7,976,044 was accounts receivable. The working assets, including raw materials, supplies, etc., was valued at $13,119,286. The liabilities include, capital stock, $40,698,988; funded debt, $22,334,000; collateral notes, $6,720,000; long term notes, $1,383,650; current liabilities, $3,047,874; of which $2,187,666 was accounts payable. The reserve for adjustments of inventories, notes and accounts receivable, etc., was $1,294,178.

TRADE PUBLICATIONS.

Structural Beams.—The Carnegie Steel Company, Pittsburgh, Pa., has published a pamphlet entitled Structural Beams, which gives information and data on the new lines of I-beam sections.

Grates.—The Shear-Klean Grate Company, Chicago, has published a small booklet on Shear-Klean grates, in which their many advantages are pointed out and in which their construction is briefly and concisely described. It is claimed that these grates save both coal and labor.

Michigan Central.—The passenger department of this company has published an attractive illustrated folder entitled Michigan Resorts. In this folder the choice vacation spots along the lines of this company are briefly described and their various attractions are enumerated. Hotel prices are included.

Lamps.—The General Electric Company, Schenectady, N. Y., has published bulletin No. 4947 on the illumination of electric railway cars and the advantages possessed by Edison Mazda and Gem lamps for this service. The bulletin contains illustrations showing the illumination of cars by these two types of lamps as compared with that resulting from the use of the old carbon filament lamp.

Southern Pacific.—The passenger department of this company has published an attractive booklet entitled Grandview, Washington. This booklet tells of the opportunities and resources of the Yakima Valley, Wash. It is fully illustrated, and discusses the success with which many of the inhabitants have made in the production and cultivation of agricultural products. Interesting facts about the climate, the soil, and the prices of land are also included.

Railway construction progressed very materially during 1911 on the 20 lines under construction for the Chilean government, covering 1,580 miles, to cost $56,580,331 when completed. At the close of the year rails were laid on about one-half of these new lines.

Railway Construction.

New Incorporations, Surveys, Etc.

Alaska Roads.—See item in general news regarding the construction of new railway in Alaska.

Algoma Central & Hudson Bay.—The Canadian parliament has granted a subsidy at the rate of from $3,200 to $6,400 a mile for building the following lines: From Sault Ste. Marie, Ont., to the Canadian Pacific, between White river and Dalton, not to exceed 200 miles; from Michipicoten Harbor towards the Canadian Pacific, 50 miles; from a point on the Canadian Pacific towards the National Transcontinental, 50 miles, and for a line from a point on the Canadian Pacific north to a junction with the National Transcontinental, 65 miles. The junction with the Canadian Pacific is at Franz, near Hobon, 194½ miles, and of this mileage, about 14 miles remains to be laid, and several bridges have to be constructed. It is expected that all the work will be completed by the fall. From Michipicoten Harbor towards the Canadian Pacific, track has been laid to Magpie Mine, about 26½ miles. Grading is in progress on the extension from Franz, north on about 100 miles to a junction with the National Transcontinental, at a point about 142 miles west of Cochrane, Ont., to be named Grant. Subsidies at the same rate have been granted to the Algoma Eastern, a subsidiary of the A. C. & H. B., for a line from a point between Sudbury, Ont., and Little Current, towards the A. C. & H. B. for 76 miles, and from Sudbury north for 30 miles. R. S. McCormick, chief engineer, Sault Ste. Marie, Ont.

Algoma Eastern.—See Algoma Central & Hudson Bay.

Buctouche & Western.—This company has been granted an extension of time to build from Buctouche, N. B., north to Rexton, thence to Richibucto, about 20 miles, or to some other shipping point. The company was incorporated in New Brunswick in 1905. The provincial directors, when the company was chartered, included R. A. Irving, A. B. Carson, E. J. Smith and F. W. Summer, Buctouche.

Carolina, Clinchfield & Ohio.—This company has sold $5,500,000 of notes to carry out the work on the proposed extension from the present northern terminus at Dante, Va., north to Elkhorn, Ky. About eight miles has been finished, and the company expects to have all the work completed by the end of 1913 The extension will be through a mountainous country, and calls for very heavy construction work, including the piercing of 19 tunnels. The Rinehart & Dennis Company, Charlottesville, Va., will be given a contract to build 35 miles. The cost of the work will be about $5,000,000. Ward Crosby, chief engineer, Johnson City, Tenn. See an item under Railway Financial News.

Cherryvale, Oklahoma & Texas.—See Kansas, Oklahoma & Southwestern.

Chicago & Eastern Illinois.—President B. L. Winchell has announced that a line will be built into Peoria, Ill., but the route has not yet been announced.

Cincinnati, Licking Valley & Virginia.—Incorporated in Kentucky to build from a point on the Ohio river in Kenton, Campbell or Bracken counties, via the Licking river valley south to the Virginia state line, about 160 miles. J. B. Walker, president; T. G. Stuart, vice-president, Winchester, Ky.; and F. D. Buskirk, secretary and treasurer.

Cincinnati, Louisville, Lexington & Maysville Traction.—An officer writes that grading work is now under way from Covington, Ky., south via Independence, Walton, Crittenden, Dry Ridge and Jonesville, to Owenton, about 45 miles. Grading work has been finished on 10 miles. There will be one steel bridge about 400 ft. long. Perry Simpson and J. Dawatt, Dry Ridge, are the contractors. W. T. S. Blackburn, president, Dry Ridge.

Colorado, Texico & Aransas Pass.—According to press reports, M. C. Vaughn, of Portales, N. Mex., representing Chicago capitalists, has bought a right of way, which had already been graded, for this company. The plans call for a line from the Colorado coal fields to the Gulf of Mexico. It is understood that the first work to be carried out will be on the section from Texico, N. Mex., through a rich agricultural section, to Virginia City. Arrangements have been made for financing the project.

ELKIN & ALLEGHENY.—This company has sold $1,800,000 of bonds to carry out work on the line building from Elkin, N. C., through Allegheny, Ashe and Watauga counties, 150 miles, to provide railway facilities in a mountainous but very productive section. The line is being built by the state of North Carolina, and is completed from Elkin to Thermont, 12 miles. J. A. Mills, president and general manager, Raleigh. (March 29, p. 780.)

GEORGIA COAST & PIEDMONT.—This company has been authorized to make a new mortgage, part of the proceeds will be used to extend the line from Darien, Ga., south to Brunswick, 15 miles, also for an extension from Reidsville to Vidalia on the north, about 25 miles, and for other improvements. A. de Sola Mendes, vice-president and general manager, Darien. See an item under Railway Financial News.

GRAND TRUNK.—See comments in another column regarding the extension of the Grand Trunk to Boston, Mass., under the charter of the Southern New England.

GRAND TRUNK PACIFIC.—The province of Saskatchewan has passed a bill authorizing this province to guarantee the payment of the principal and interest on the bonds, stock and other securities of the Grand Trunk Pacific Saskatchewan, to an amount not exceeding $13,000 a mile. The company plans to build the following lines in Saskatchewan: From Watrous southwesterly via Swift Current to the international boundary; from Saskatoon westerly and northwesterly to Battleford; from Melville northerly and northwesterly to Regina; Saskatoon southeasterly, southerly and southwesterly to Regina; from township 36, range 8, west of the third meridian, southwesterly and westerly to a junction with the Biggar-Calgary line. Part of the lines must be completed during 1912, and all of the lines must be finished by the end of 1914. B. B. Kelliher, chief engineer, Winnipeg, Man. (March 1, p. 1912.)

GRAND TRUNK PACIFIC SASKATCHEWAN.—See Grand Trunk Pacific.

KANSAS, OKLAHOMA & SOUTHWESTERN.—This is the new name of the Cherryvale, Oklahoma & Texas. The new company has a capital of $20,000,000, and plans to build from Kansas City, Mo., southwest through Kansas to a point in Oklahoma, about 900 miles, with a branch from Caney, Kan., southeast to Fayetteville, Ark., and another branch from Pawhuska, Okla., southeast to Shreveport, La., 300 miles. A branch is also to be built from Pawhuska southwest to El Reno, and another branch from Oklahoma City south to a point in Texas. It is the present intention of the company to make Houston the main southern seaport terminus. R. E. Wade and S. A. Masters, Perry, Okla.; J. H. Brewster and F. D. Brewster, Independence, Kan.; and S. M. Porter, Caney; are the promoters.

LAKE ERIE & EASTERN.—See Pittsburgh & Lake Erie.

LAKE SHORE & MICHIGAN SOUTHERN.—See Pittsburgh & Lake Erie.

LONG ISLAND.—A contract has been given by the Brooklyn Grade Crossing Commission to W. H. Gahagan, Brooklyn, N. Y., for the reconstruction of about 6,000 ft. of the Manhattan Beach division of the Long Island in East New York. There will be a tunnel of four tubes, about 3,530 ft. long, and an embankment from about Granite street at Evergreen Cemetery to the borough line. The work is to be finished within two years. J. R. Savage, chief engineer, Jamaica, N. Y.

LOUISVILLE & NASHVILLE.—A franchise has been granted by the authorities of Clarksville, Tenn., permitting this company to build an extension to a point near the public square in Clarksville. The improvements will cost about $200,000. W. H. Courtenay, chief engineer, Louisville, Ky.

MEXICO TRAMWAYS COMPANY.—This company is now at work building interurban electric lines from the City of Mexico, Mex. One line is to be built from Mexico City southeast to Puebla, about 80 miles, and another line southwest to Toluca, about 45 miles. It is expected that the Toluca line will be ready for operation as far as Cuajimalpa, about nine miles, by July, and the Puebla line is expected to be finished to Tlulyhualaco about the same time. H. Harren, general manager.

PECOS VALLEY SOUTHERN.—This company has under consideration a proposition to build a branch from Saragosa, Tex., southeast to Fort Stockton, about 60 miles. It is said that the branch will be built if residents along the route will subscribe a bonus of $200,000 in aid of the project, also a right of way and ground for terminals, etc. Extensions are also planned from Pecos northerly to Lubbock, about 200 miles, and from Balmorhea south to Alpine, about 50 miles. It is said that work will be started soon on both these extensions. L. W. Anderson, general manager and chief engineer, Pecos.

PITTSBURGH & LAKE ERIE.—The Lake Erie & Eastern, a subsidiary of the P. & L. E., and the Lake Shore & Michigan Southern, has now under way 10 miles of very heavy work through the city of Youngstown, Ohio. This line crosses the Mahoning river five times, and also crosses the tracks of the Pennsylvania, the Baltimore & Ohio, and the Erie several times. All grade crossings with streets and railways are separated. Contracts for the three middle sections of work have recently been let to H. A. & R. L. Culbertson, Cleveland; the McKelvy Hine Company, Pittsburgh; and the Duquesne Contracting Company, Pittsburgh. Bids have been received on the remaining two sections, and contracts will be let shortly. The contracts call for the completion of the line within one year.

ST. LOUIS, BROWNSVILLE & MEXICO.—This company is planning to build a branch, it is said, from Heyser, Tex., on the Port O'Connor branch, to Austwell on San Antonio bay. Surveys are now being made, and construction work will be started soon. F. G. Jonah, chief engineer, St. Louis, Mo.

TEXAS ELECTRIC.—An officer writes that the projected route is from Dallas, Tex., south via Waxahachie, Hubbard, Marlin, Temple, and Taylor, to Austin, with a diverging line southeast via Corsicana to Palestine. Contracts are to be let in about 90 days to build the section from Dallas to Waxahachie, and for a section of the branch from Corsicana to Palestine. There will be three small steel bridges and about two miles of trestling work. J. V. Watkins, president, 502 Scollard building, Dallas.

WESTERN MARYLAND.—An officer writes that contracts have been given to R. Galiardi, Connellsville, Pa., for grading, etc., and to the Pennsylvania Steel Company, Philadelphia. Pa., for the steel bridge work, on a branch to be built from Charlton Station, Md., in a general southerly direction about 3½ miles, crossing the Potomac river into West Virginia. There will also be a spur in West Virginia from this branch, about one-half mile long, to proposed quarries. The work includes putting up an 1,175-ft. steel bridge over the Potomac river. H. R. Pratt, chief engineer, Baltimore, Md.

RAILWAY STRUCTURES.

AUGUSTA, MAINE.—Work is now under work on the abutments for a new 70-ft. steel bridge, to carry two tracks, for the Maine Central, over Two Mile creek at a point two miles northeast of Augusta.

CHARLTON, MD.—See Western Maryland under Railway Construction.

COVINGTON, KY.—See Cincinnati, Louisville, Lexington & Maysville Traction Company under Railway Construction.

DALLAS, TEX.—See Texas Electric under Railway Construction.

GAINESVILLE, GA.—According to press reports, the Southern Railway is making plans for putting up a new passenger station, remodeling and enlarging the present freight station and also rearranging the tracks at Gainesville. The new passenger station is to be of brick construction with tile roof, 34½ ft. x 133 ft.

LONG ISLAND CITY, N. Y.—A contract has been given by the New York Connecting Railroad to the P. A. Gillespie Company, New York, for the masonry and foundation work between Stemler and Lawrence streets, about 3,500 ft., on one-half of the approaches in Long Island City to the bridge, to be built over the East river.

NORTH FOND DU LAC, WIS.—The Minneapolis, St. Paul & Sault Ste. Marie has announced that a new 37-stall roundhouse will be built at this point.

WICHITA, KAN.—An agreement has been reached between the city officials and the Wichita Union Terminal Association providing for the erection of a union station and track elevation estimated to cost over $2,000,000.

Railway Financial News.

Boston & Maine.—F. S. Moseley & Co., New York, and Lee, Higginson & Co., Boston, are offering at 99⅞, yielding about 4⅛ per cent., $12,000,000 1-year 4 per cent. coupon notes, of June 10, 1912-1913.

Canadian Northern.—William A. Read & Co., New York, and the Dominion Securities Company, Ltd., Toronto, Ont., have purchased jointly $5,000,000 Canadian Northern 4½ per cent. equipment trust notes, payable in semi-annual instalments over a period of 10 years, and secured by new equipment, on which the railway makes an initial cash payment of 25 per cent. Of the total amount of $5,000,000, $2,000,000 was issued as series C-1 of 1912, and sold in Philadelphia, Pa., as previously mentioned. The remaining $3,000,000 will be known as series D-1 of 1912, and will probably be offered for sale in the near future.

Canadian Pacific.—It is said that this company has bought the Kootenay Valley, which runs from Bonner's Ferry, Idaho, to Creston, B. C., and that operation will be turned over on June 1.

Carolina, Clinchfield & Ohio.—Blair & Co., New York, have bought $5,500,000 5 per cent. notes of May 1, 1912-1917, secured by a first mortgage on the proposed extension of the road, from its northerly terminus. Dante, Va., to Elkhorn, Ky., a distance of 40 miles.

See item under Railway Construction News.

Cincinnati, New Orleans & Texas Pacific.—W. Cooper Proctor has been made a director, succeeding M. E. Ingalls, resigned.

Duluth, Missabe & Northern.—This company has called for payment on July 1, at the New York Trust Company, New York, $210,000 general mortgage 5 per cent. bonds of January 1, 1906-1914 at 105 and interest.

Elkin & Allegheny.—See item under Railway Construction News.

Georgia Coast & Piedmont.—The Georgia railway commission has authorized this company to make a new mortgage to secure an issue of $3,500,000 bonds, of which a block will soon be sold to extend the road from Darien, Ga., to Brunswick, 15 miles. The mortgage will also provide for the extension from Riedsville to Vidalia and other improvements; a sufficient amount to be reserved to take up the underlying bonds. This roads runs from Darien to Collins, 82 miles.

Interborough Rapid Transit.—J. P. Morgan & Co., New York, have bought $170,000,000 first mortgage five per cent. 53 year bonds. The purchase contract is contingent upon the approval by the Court of Appeals of the preferential payment of 8.76 per cent. provided for in the arrangement between the city and the Interborough company. Of these bonds, $200,000,000 have been authorized. The proceeds of the present issue will be used as follows: for refunding present debts, $50,656,950; new subway construction, $56,000,000; Manhattan Railway improvements $30,000,000; equipment of new subways, $21,000,000; other charges, including discounts, $9,500,000. The payments will be distributed over a period of four years.

Interoceanic of Mexico.—This company on May 13 issued a circular letter to the holders of the $7,000,000 first preference non-cumulative 5 per cent. stock, advising them that owing to the disturbed political conditions in Mexico, the payment of the dividends on this stock would be deferred until the accounts for the year have been audited, which will be about November.

Kootenay Valley.—See Canadian Pacific.

Maine Central.—Stockholders on May 24 authorized the increase in the capital stock from $10,000,000 to $15,000,000.

New York, Ontario & Western.—This company has made application to the New York Public Service Commission, Second district, for authority to issue $2,171,000 general mortgage bonds. The proceeds are to reimburse the company for money spent since December 1, 1910, from income, etc., as follows: Construction of second track on Scranton branch, $711,520; additional sidings and extensions of sidings, $234,782; shops, engine houses and turntables, $307,190; machinery and tools, $151,305; equipment, $278,375.

Norfolk & Western.—W. W. Atterbury, a vice-president of the Pennsylvania Railroad, has been elected a director, succeeding John B. Thayer, deceased.

St. Louis, Rocky Mountain & Pacific.—Fisk & Robinson, New York, have sold at 84, $532,000 first mortgage 5 per cent. bonds due June, 1955. There are $7,500,000 of these bonds outstanding. The proceeds have reimbursed the company for payment of $251,000 short-term notes due April 1, 1912, and provided additional working capital. A statement by the company says that no unfunded debts are now outstanding.

St. Louis Southwestern.—The Guaranty Trust Company, Rhodes & Company, and William Salomon & Company, all of New York, it is understood, will shortly make a public offering at 99½, yielding about 5.60 per cent.; the unsold portion of their block of $7,500,000, first terminal and unifying mortgage 5 per cent. bonds. Of these bonds, $100,000,000 was authorized and $7,500,000 is outstanding, as was mentioned in our issue of February 16. The proceeds of the present issue, will be used as follows: New terminal properties at St. Louis and Ft. Worth, at cost, $2,250,000; to retire outstanding equipment obligations of an equal face value, $2,165,000; to acquire $400,000 first refunding and extension mortgage bonds of the Gray's Point Terminal Railway, $400,000; to reimburse improvements, etc., already made out of revenue, $2,685,000. The balance of $92,500,000 may be issued as follows: To refund, purchase or acquire prior mortgage bonds of like face amount, viz., St. L. & S. W., first consolidated mortgage 4 per cent. bonds, due 1932, $25,000,000; and bonds of controlled companies, $15,950,000; total, $40,950,000; for additions, improvements, new equipment, etc., $51,550,000.

Seaboard Air Line.—Walter Rosen has been elected a director, succeeding Benjamin S. Guinness, resigned.

From 1890 to 1909, the freight and passenger traffic on the Hungarian state railways increased 301 per cent., and in that period, not only were the conditions and betterments insufficient, but also the new acquisitions of rolling stock. In one year where the traffic increased 9.05 per cent., the number of freight cars increased only 2.05 per cent. In another year, the traffic increased 11 per cent., and the number of freight cars increased 0.1 per cent. In regard to the locomotives, the number now in operation is entirely insufficient. In 1900, on account of the increasing traffic, 255 new locomotives were needed, but only 57 were bought. In 1905, 22 locomotives were bought where 283 were needed. In 1910, it was estimated that the system was operating 606 less locomotives than were actually needed to handle the traffic under normal conditions. While the traffic increased 51 per cent., the number of locomotives was only increased by 21 per cent. The system possesses a very large number of locomotives over 35 years old in proportion to the total number of locomotives in operation. While these locomotives, which are designated as locomotives of the third class, cover annually about 12,000 miles, the locomotives of the second class cover about 21,600 miles, and those of the first class about 24,000 miles.

Among railway projects submitted to the Russian committee on proposed new railways, particular attention is attracted by the proposed line Uchta-Petchor-Kama, which is designed to serve the great Petchor area and, if the Uchta oilfields should turn out as well as some anticipate, the line would have a considerable economic importance. The district has very few railways, although on the other hand the waterways are plentiful enough; but the want of the railway is severely felt and is the subject of continuous agitation on the part of the business people of the region. The direction the line is intended to take would serve districts producing gold, copper, lead, manganese, iron, asbestos, salt, gypsum, coal, turf, fireclay, magnesite, pyrites, limestone and marble. It would follow a line from the station of Usobye on the Usobye branch of the Perm railway north to Solikamsk and Tcherdyn to the village of Troitzk-Petchor on the Petchor river. Then the line would turn back to the village at Ust-Uchta. The probable traffic on the line has been carefully worked out. The capital for construction is $116,116,800, to be raised in shares and bonds of which the interest would be guaranteed by the government, and it is thought that as the construction of the line would mean a vast increase in the government timber traffic, there is every inducement to afford the guarantee.